SCIENTIFIC AMERICAN

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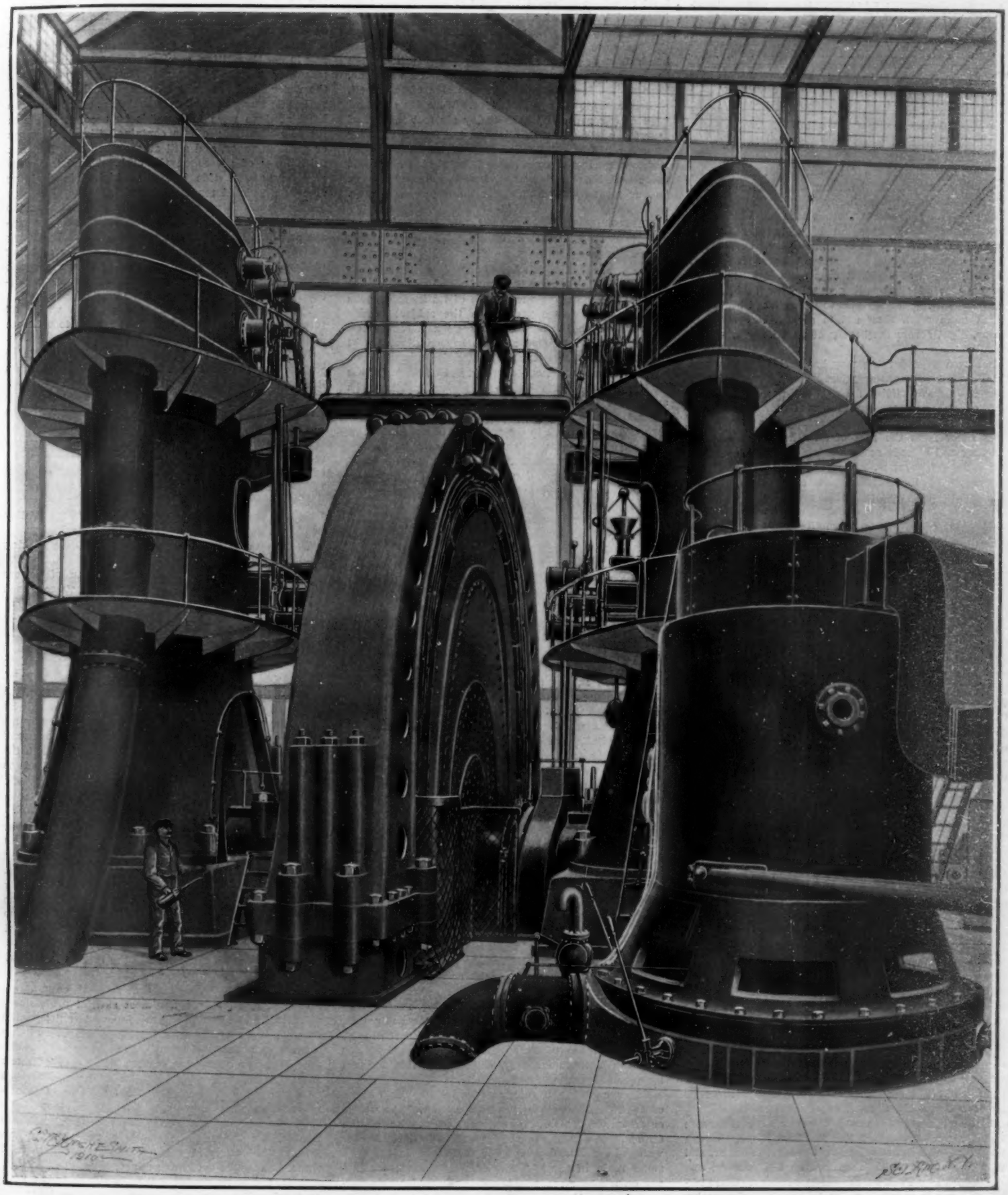

By interposing the turbine, shown in the foreground, between the reciprocating engine and its condenser, the maximum capacity of each unit has been raised from 11,250 horse-power to 22,500 horse-power, and the steam consumption reduced from 15.7 to 10 pounds per horse-power hour.

HOW THE CAPACITY OF THE NEW YORK SUBWAY POWER PLANT WAS DOUBLED.—[See page 234.]

SCIENTIFIC AMERICAN
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NEW YORK, SATURDAY, SEPTEMBER 24th, 1910.

The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

ELECTRIC SIGN MONSTROSITIFS.

IT was inevitable when once the electric incandescent and arc lights had been perfected, that their peculiar fitness as instruments of advertising should ultimately be recognized. The electric sign, if it be arranged with any degree of taste, is not unattractive. Compared to that modern atrocity in the form of Brobdingnagian billboards strewn out along the railroad routes of the country, the average electric sign is a thing of positive beauty. Moreover, being displayed at night, it does not tell its story at the expense of surrounding country or background, being in this respect superior to the railroad billboard, which more often than not is spread, like an ugly smear, right across the beauty of an otherwise attractive landscape.

But even a good thing may be carried too far, and this is what is happening just now in the matter of electric sign advertising. We have in mind the erection of an enormous and most unsightly steel-and-terra cotta tower in Times Square, in this city, which rises sheer from the roof of an otherwise attractive building and extends some hundreds of feet above the sidewalk. This tower, whose surface is entirely unbroken by window, cornice, pilaster, or column, is to be covered, unless the hopes of its projectors are doomed to disappointment, throughout the whole vast width and height of it, with mammoth electric signs. By night, the affair will have a certain spectacular attractiveness and an undoubted commercial value—but by day! It would be difficult to conceive of an object more vulgarly obtrusive and more exasperatingly ugly than this bald shaft of steel and masonry, gridironed from top to bottom by the framework and wiring that go to make up electric sign paraphernalia.

Unfortunately, the permit for this structure, obtained during the previous city administration, is of such a character that Superintendent Miller of the Building Department confesses himself to be powerless to prevent or even modify the construction. We are heartily in sympathy with Mr. Brunner, vice-president of the Art Commission, in his conviction that the time has come when a systematic effort should be made to prevent the erection of unsightly electric signs, not only in Broadway, but throughout the whole city.

NEW YORK'S NEW SUBWAY.

IF the Public Service Commission has seemed slow in producing its final plans for the addition to the subway system of New York, everyone will agree that the scheme as now made public lacks nothing in scope and dignity. Judged purely as an engineering undertaking, it will be the greatest work of tunnel excavation ever undertaken. In its complete condition, it will be about double the size and of more than double the capacity of the present subway.

The estimate of quantities made by the Public Service Commission engineers show that a total of over 9,000,000 cubic yards of earth and rock will have to be excavated, as against the 4,000,000 cubic yards which was taken out of the present subway. This material, if piled upon a lot 100 feet square, would extend to nearly twice the height of the Washington Monument. The bill of steel and iron alone calls for 203,000 tons, which if rolled into steel rails, would suffice to lay an unbroken railroad line from New York to Santa Fé, a distance of 2,280 miles.

From Fort Hamilton and Coney Island, the route lies through Brooklyn, below the East River, through the length of Manhattan, below the Harlem River, and through the Bronx to Woodlawn on the western, and to Pelham Bay Park on the eastern branch. The present subway is about 25 miles in length, and contains about 70 miles of single track. The new system will be 44 miles in length, and will embrace 133 miles of single track. The most important difference between this and the present subway is that the section of the new tunnel will be two feet higher and seven feet wider, the change being made with the object of allowing steam trains from the steam railroads to pass into the subway and carry out-of-town passengers direct from the suburbs into the heart of the business and shopping districts.

Commissioner Bassett of the Public Service Commission objects to this enlargement of the section on the ground that it will not only greatly increase the cost of construction, but will prove to be too wide for many streets. This will involve interference with foundations, and necessitate large purchases of real estate, especially where the curves occur. He draws attention to the fact also that four extra steps will be required at the stations, and that when subways cross each other, the lower subway will be six feet below the level at which it would be had the subway not been increased in height by two feet.

Although there seems to be much force in these objections, it must be borne in mind, on the other hand, that errors in engineering plans which have become apparent many years after the work was done, have almost invariably been on the side of too small, rather than too large, dimensions. Were the standard gage of our railroad tracks to-day six feet instead of four feet eight and a half inches, the freight capacity of our roads would be sufficient to take care of all business during the seasons of heaviest traffic, and there would be no danger of freight congestion, even on our most crowded lines, for many years to come.

A REVIEW OF THE REPORT OF THE METROPOLITAN SEWERAGE OMMISSION.

THE Metropolitan Sewerage Commission of New York, of which Dr. George A. Soper is president, has recently issued a voluminous report summing up the results of its investigations during the past two years into the subject of the pollution of the waters of New York harbor. The report is comprehensive and touches on a variety of subjects, such as population, sewerage systems, volumes of sewage produced, currents and character of the harbor waters, the pollution of shores, public baths and oyster layings, and makes several explicit recommendations with the view of remedying existing or prospective evils due to the pollution of the harbor.

Much of the information is of an original nature, and much, while known before, had never been brought together, and its relation to sanitation pointed out. Taken altogether, the evidence adduced indicates certain existing conditions, such as the pollution of the Harlem River, of floating baths and of oyster layings, besides local defects in sewers that call for prompt remedy. But beyond these, there is to be solved the greater problem of the final disposition of the sewage of an immense population, in such a way as to maintain decent conditions in their streets and homes, and preserve the waters of one of the greatest and finest ports of the world from defilement.

Eight hundred and forty-four analyses of the water and underlying deposits were made for dissolved oxygen, 2,000 for bacteria, 806 for microscopic evidences of pollution in the mud underlying the harbor, and about 13,000 for the salinity of the water. The first of these, showing the per cent saturation of oxygen, gave results which are particularly enlightening as to the pollution of the harbor and its capacity to satisfactorily digest a further increase of sewage. It was found that whereas the water of the open ocean is fully oxygenated, that of Long Island Sound near Throgs Neck is 99 per cent saturated, the lower bay 97 per cent, Gravesend Bay 90 per cent, upper East River 86 per cent, the Hudson River opposite Mount St. Vincent and the Narrows 83 per cent, the Arthur Kill 82 per cent, Kill van Kull 79 per cent, Newark and Jamaica bays 76 per cent, the Hudson opposite Manhattan 72 per cent, the upper bay 67 per cent, the lower East River 65 per cent, and the Harlem River 55 per cent. These figures show the Harlem and lower East rivers to be grossly polluted and the upper bay to contain so great a load of organic matter as to require careful guarding hereafter.

The salinity tests, most of which were made through the courtesy of the government at lighthouses, furnished valuable information regarding the admixture of sea water with the fresh water at different points, at different times of the year, and at different depths. They were made with a specially designed hydrometer inclosing a thermometer, and were suitable for use by a non-expert.

Experimental work along several lines was carried on to throw light on the final disposition of the wastes entering the water. These included studies of the diffusion of sewage, colored by a strong dye, in harbor water of different densities and depths, beginning on a small scale in the Commission's laboratory, continuing on a larger scale in tanks set aside for this purpose by the New York Aquarium, and ending with sixty-six experiments on a yet larger scale carried on from a boat to depths up to 62 feet. These showed the advantage of a discharge into deep, rapid currents of water in promoting diffusion.

A thorough study of the complicated tidal phenomena of New York harbor was made. The U. S. Coast and Geodetic Survey collected valuable material, hitherto unpublished, and furnished this to the Commission, with answers to a number of specific questions, and this was supplemented by the Commission with a large number of float observations, taken at different seasons and in different parts of the harbor. Some unexpected results followed these studies, such as the fact that at times there is no resultant tidal flow toward the lower bay in either the East River or the Arthur Kill. A float set adrift off College Point December 27th, 1909, at 10 A. M., oscillated back and forth between Whitestone Point and Brooklyn Bridge until 4:30 P. M., December 30th, when it was taken up off North Brother Island, about two miles from the starting point, having traveled nearly 108 miles.

A careful inspection was made of the larger sewers of Manhattan. This brought to light some very interesting conditions. While the newer sewers were generally in good condition, some of the older ones were, in places, in a state of collapse. Marginal sewers along the water front generally contained much foul, sludgy sediment; many in the lower business sections and the hotel sections were inaccessible on account of steam illegally admitted; others contained illuminating gas or gasoline vapor, and still others were coated with a thick layer of grease on the arch. The latter were generally sewers tide locked at high tide draining densely populated tenement districts.

After establishing experimentally the fact that the public bath houses are directly contaminated by sewage and that many local nuisances exist, and pointing out the fact that conditions were in danger of being rendered worse if certain large sewerage projects were carried out, a number of specific recommendations were made, among which were the following:

The preparation of an outline plan, to which all future sewerage work, so far as it relates to ultimate disposal, should conform.

The interception and disposal elsewhere of a large part of the sewage now discharged into the Harlem River.

A detailed study of the sewage disposal of those areas of Brooklyn and Queens now draining to Jamaica Bay and the upper East River.

The preparation of plans for reconstructing the sewerage of Manhattan on the separate system, its adoption being dependent upon the construction of additional north and south subways.

Insistence upon adequate purification of the sewage from the proposed Passaic Valley and Bronx Valley trunk sewers before discharging into the harbor.

The gradual abolishment of the free floating bathing establishments.

Closer co-operation between the Bureau of Sewers and the various city departments and between each other.

A careful study of the population lying within the metropolitan district, or within a radius of about 20 miles of the City Hall, was made. This showed a total population in 1905 of 5,332,000, equivalent to that of Chicago, Philadelphia, St. Louis, Boston, Baltimore, and Columbus combined, or over half that of the combined States of New York and New Jersey. By 1940 the population of this district will probably approximate 11,866,000, while that of New York will increase from 4,000,000 to 8,600,000. At present the 2,500,000 population of Manhattan is increased to 3,000,000 during business hours.

AMERICA'S CHANCES IN THE AEROPLANE RACE.

THE defeat of Curtiss in his racing biplane by Grahame-White in his Blériot monoplane, at Boston, is a bad augury for the retaining of the international aviation trophy in America. Both machines were of the same horse-power (50), and although White's motor and monoplane was somewhat lighter than the motor and biplane of Curtiss, his chief advantage lay in the reduced head resistance of the single-surface type of machine, owing to the smaller spread and the lack of struts and guy wires.

France has entered in the race three powerful monoplanes, piloted by her most skillful professional aviators, and England has followed suit; while America has only the promise of new Wright and Curtiss racing biplanes of from 65 to 90 horse-power. The new 14-cylinder revolving motor, which has driven a Blériot monoplane some 70 miles an hour, developed on a recent 10-hour test only 75 horse-power. Improvements have since been made, however, so that a considerable increase in power is obtained. In addition to this, Blériot has an arrangement for reducing the surface of the wings in flight, while the curvature of these, besides, is extremely slight.

It is, therefore, probable that in the 62.1-mile race, on October 29th, a speed of over 75 miles an hour will be attained.

It is obvious that American sportsmen should immediately construct high-powered monoplanes capable of defending the cup.

ENGINEERING.

The report that the famous Hoosac Tunnel is to be changed from steam to electric operation is confirmed by the officials of the Boston and Maine Railroad. It is stated that the preliminary estimate of the cost of the change, including the cost of the electric locomotives, will be one million dollars. Passenger and freight trains will be taken through the Hoosac Mountain by electric locomotives between Tunnel Station on the east and North Island on the west.

The penetrating power of the 12-inch gun was recently demonstrated at Sandy Hook, when a concrete wall 20 feet thick and heavily reinforced with steel beams was pierced by a 12-inch shell fired at high velocity. The equivalent penetration for this shell would have been 22 inches of armor. Although the concrete was mastered by the gun, the way it stood up to the attack was, we understand, gratifying to the authorities and confirms its fitness for use in coast fortifications.

It is reassuring to learn from the testimony given before the investigating board that the recent explosion and fire which originated in the oil-burning plant on the "North Dakota," was not due to any inherent faults in the system, but merely to a defective joint in the oil pipes. It transpired that the fire resulted from the dripping of oil from a leaky joint on to the superheater, where it flashed and fired the oil in the settling tank. Engineer-in-Chief Cohen states that the report of the Board contains nothing to discourage the continued use of fuel oil in the navy.

The transatlantic record to the westward has again been reduced by the Cunard liner "Mauretania." Leaving Queenstown on Saturday, the ship passed Daunt's Rock at 10:08 Sunday morning, September 11th, and reached the Ambrose Channel lightship at 3:49 P. M. the following Thursday, September 15th. The total time of the passage was 4 days 10 hours and 41 minutes, which is ten minutes less than the record established by the same vessel last season. The distance is 2,780 knots, and the average speed is 26.06 knots.

Although Germany and England lead the world in the art of map-making, we doubt if they have ever produced a single map which equals in size and in the detail of its information the great map which has recently been prepared in this city for the use of the directors of the Missouri Pacific Railroad. The map, which is 35 feet wide by 45 feet high, includes, on a scale of eight miles to the inch, the North American continent from the Canadian border to Panama. Its special purpose is to show, in their positions and relations, the railroads of the country.

The Cape Cod canal, which was begun on June 22nd, 1909, will have cost $12,000,000 by the time it is completed. The excavation is chiefly in sand, and no locks will be necessary. The bottom width will be 100 feet through the central portion, and 300 feet at the ends. It is estimated that 23,000 ships, carrying 25,000,000 tons, annually traverse the Nantucket shoals passage, and that about half a million people are carried over this route annually. The canal will shorten the distance from New York to Boston by 70 miles, and it is believed that the major portion of this tonnage and passenger traffic will seek this shorter and less stormy route.

The completion of the first year of concreting work on the Gatun locks shows that 655,083 cubic yards have been placed, and that about 1,440,000 cubic yards remain to be done. The greater part of the work has been built in the upper or lake-level locks, and preparations are now being made to move the huge forms, with their supporting towers, each of which complete weighs about 2,200 tons, to the next level below, the transit being made over timber inclines. In this connection, it is gratifying to learn that the hydraulic fill at the Gatun dam is about one-third completed, 4,115,214 yards having been pumped into place by the hydraulic dredges. On August 1st, the dry fill, consisting of excavated material brought in on trains and dumped along each toe of the dam, amounted to 5,900,569 cubic yards.

Statistics recently given out by the Rapid Transit Company show that during the past five years there has been a phenomenal growth in the passenger traffic of New York city. In 1906, the subway carried, in round numbers, 138,000,000 passengers, and in 1910, 269,000,000. In the same years, the elevated system carried respectively 258,000,000 and 294,000,000. The most significant fact made public by the Interborough Company, which operates both systems, is that the combined subway and elevated lines carried from July, 1909, to July, 1910, 300,000,000 more passengers than were carried on the elevated system alone from July, 1903, to July, 1904, a year before the subway was opened. Moreover, these additional 276,000,000 passengers were not drawn away from the trolley lines, since the latter are doing as much business as they did six years ago.

AERONAUTICS.

A prize of $10,000 has been offered by James H. Moore, of Rochester, N. Y., to the first aviator flying from Rochester to Detroit. The conditions are to be left for decision to a committee of aviators.

On September 10th, Capt. Thomas S. Baldwin flew seven miles down the Mississippi River and seven miles back again, landing at a point on the east shore opposite 3000 South Pestalozzi Street, St. Louis.

The municipality of Paris proposes to offer a prize of $20,000 to the French aviator making a flight with a passenger from Paris to Brussels and back on the occasion of the visit of the Paris city fathers to Brussels on September 26th.

The two dirigible balloons used for aerial scout duty during the recent German maneuvers failed grievously on September 9th, one crew leading its army into an ambuscade, while the other crew fell into the hands of the enemy when the motor gave out.

Glenn H. Curtiss has announced that he will soon withdraw from public flying. He will, however, attend the preliminary flight at Chicago before the start of the New York Times-Chicago Evening Post race from Chicago to New York, in which three Curtiss machines will take part.

The commission of French naval experts, under the presidency of Admiral Le Pord, which was appointed to study the question of the employment of aeroplanes as an arm of the naval service, has presented the first of its reports. Although the details are kept secret, it is known that the commission unhesitatingly recommends the creation and equipment of an aerial fleet for service in naval warfare.

On September 9th, Charles K. Hamilton sustained serious injuries in the presence of more than 20,000 State Fair spectators at Sacramento, Cal. Just before his injury he had lowered the record for a circular mile by covering it in one minute flat on three laps. As he was preparing to alight, his engine became disabled, and the machine crashed to the earth. It is stated that the pilot wheel jammed him back against the radiator.

The Aerophile, the official organ of the Aero Club, announces that the altitude reached by Morane on September 3rd was 8,271 feet and by Chavez on September 8th 8,409 feet. Morane at the Bordeaux meeting covered 20 kilometers (12 miles) in 12 minutes 38 seconds, a record for the distance. It is officially stated that the times made by Aubrun at the same meeting September 14th established records for from 20 to 205 kilometers (12.4 to 127.4 miles). He traveled the latter distance in 2 hours 22 minutes.

Clifford B. Harmon will compete for the trophy offered by the Rumson Country Club of Seabright, N. J., to the first amateur aviator to fly from the grounds of the club, remain in the air at least one-half hour, and alight on the same grounds. Mr. Harmon will make an effort to win the New York Times cup for the first amateur aviator to leave the grounds of the Rumson Country Club and land at Governors Island. The competition at the Rumson Country Club is open to all amateur aviators, and Mr. Harmon is the first to enter the list.

The monoplane was practically used in the French army maneuvers of this year. Lieut. Acquiviva, of the Blue army, flew over the Red army's position, despite a heavy fog which rendered it impossible for a dirigible to venture forth. He was fired upon by a machine gun on an automobile which pursued him. It was agreed that in real war he would have escaped as easily as he did at the maneuvers. Three other officers were engaged in scouting in aeroplanes. One of them, Lieut. Bellinger, brought in information in half an hour that would have taken a cavalry reconnoissance half a day to collect.

The "Zeppelin VI." is the fifth of Count Zeppelin's famous dirigibles to suffer complete destruction. While she was being housed after a rather unsatisfactory trip on September 14th (owing to a breakdown of one of her motors), she caught fire from an open gasoline tank while her crew were cleaning the machinery with this inflammable fluid. Instantly the hydrogen in the seventeen compartments ignited and the airship was quickly consumed. Ten workmen were injured, two of them seriously. During the fortnight preceding her demolishment the "Zeppelin VI." had covered 2,000 miles and had carried more than 300 passengers. She had made many successful 3-hour voyages, some of them in unfavorable weather. On August 28th, for the third time in eight days, she carried 30 passengers from Baden-Baden to Strasburg and back in three hours' time. On September 14th, with 12 passengers aboard, she started on a trip to Heilbronn. After covering some 20 miles, the airship was returned to her shed on account of the motor breakdown. The "Zeppelin VI." was built last year and was the airship used by the Count on his trip from Friedrichshafen to Berlin last August. She had since been enlarged and remodeled. She was the speediest airship Zeppelin ever built, being credited with 38 miles an hour.

SCIENCE.

It is announced in the newspapers that Mme. Curie has succeeded in isolating radium, a most remarkable achievement, if true. We must await further details, however, before we can pass any comments upon the report.

From observations made by J. C. Solá, with powers of 550 to 750 on the 38-centimeter Mailhat equatorial at the Fabra Observatory, the satellite Io of Jupiter presents a conspicuous flattening which is probably greater than that of any other known body in the solar system. From the measures it appears that the equatorial plane of Io coincides with the plane of its orbit. The flattening was approximately determined as about 1.4.

A paper on barium in soils by G. H. Failyer has been issued by the Bureau of Soils of the Department of Agriculture. From the investigation made by Mr. Failyer, it appears that barium is a widely disseminated element and is present in most soils throughout the United States, and in larger quantities, as would be expected, in soils derived from masses carrying barite deposits and in the soils derived from the rocks of the Rocky Mountains. The soil moisture may be expected to carry small amounts of barium. In all cases the feldspars of the igneous rocks from which the soil material has been derived seem to be an original source of the barium of soils.

What is the origin of binary stars? In the Astrophysical Journal (31, 185) H. W. Russell shows that the fission theory is most in agreement with the facts found from observation of existing multiple systems. For such a distribution of masses as is found among binary stars, multiple systems of this type must be pairs, one or both of whose components are themselves double, with a distance less than about one-fifth that of the wide pair. The observation of such systems is complicated, however, by the difficulty of deciding whether an apparent double star is an optical or physical binary if the period is very long. In the case of star clusters it appears that the "separate nuclei" development is the more probable course of evolution.

One of the chief difficulties in observations of the aurora is due to the continual movement of the luminosity, rendering measurements of its height, etc., uncertain. C. Stoermer has made experiments with a cinematograph objective of 25 millimeters aperture and focal length 50 millimeters, using Lumière violet label plates. In February and March, 1910, an expedition was made to Bosekop, when 800 photographs of auroræ were made, the times of exposure varying from 1 to 20 seconds, depending on the brilliancy of the phenomenon. By arranging similar observations at two stations connected by telephone, it is hoped to secure a series of simultaneous photographs which will furnish measures for determining the height of the aurora. Preliminary exposures indicate 50 to 190 kilometers.

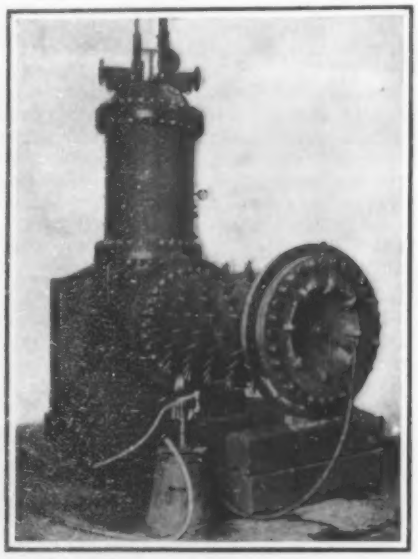
In the Astrophysical Journal (31, 258-269), Prof. J. C. Kapteyn, writing on the Evolutionary Classification of Stars, presents evidence to show the probable increase of radial velocity as the spectral type departs from that of the helium stars, which were found by Frost and Adams to have peculiarly low velocities in the line of sight. It is also found that there is a definite relation between the length of period of binary systems and their spectral type. In Dyson's second paper on the systematic motion of the stars it is shown that stars of Type I diverge less from the general drift than the other stars, so that it appears the phenomenon of star-streaming shows itself in greater purity for the younger spectral types than for the older ones. It is suggested that for the further study of this question it is desirable to investigate separately the spectral classes of the stars composing the two star streams.

Although many of the supposed coincidences between the advent of large comets and terrestrial atmospheric disturbances are doubtless much exaggerated, H. Deslandres in the Comptes Rendus ventures the opinion that it is profitable to inquire closely into the possible effect of a large stream of cometary matter on the condensation of vapors and consequent rainfall. The kathodic theory of cometary tails receives considerable support at the present time, and it has also been largely invoked for the explanation of many of the phenomena of terrestrial magnetism and auroral displays, chiefly through the researches of Goldstein, Birkeland, and Arrhenius. If the kathode rays emanating from the sun, encountering the small particles of the comet's tail repelled by the sun, produce rays analogous to Röntgen rays, these may penetrate deeply into the terrestrial atmosphere. We know that these rays produce ionization and induce condensation of saturated vapors. It is also possible that there may be a generation of kathode rays accompanying the jets from the nucleus of the comet itself, the intensity of which might to some extent be estimated from the relative intensity of the continuous spectrum in different comets.

THE HUMPHREY GAS PUMP AT THE BRUSSELS EXHIBITION

BY THE ENGLISH CORRESPONDENT OF THE SCIENTIFIC AMERICAN

A short time ago we described at length the novel gas pump devised by Mr. H. A. Humphrey, M.I.C.E. So widespread has been the interest aroused in engineering circles, that the authorities of the Brussels Exhibition persuaded the inventor to erect a complete installation under working conditions, for investigation by visiting engineering bodies. The pump is erected in the machinery section, and through the courtesy of the inventor we are enabled to describe



PUMP OF 250,000 GALLONS PER HOUR CAPACITY, SHOWING THE WATER VALVES.

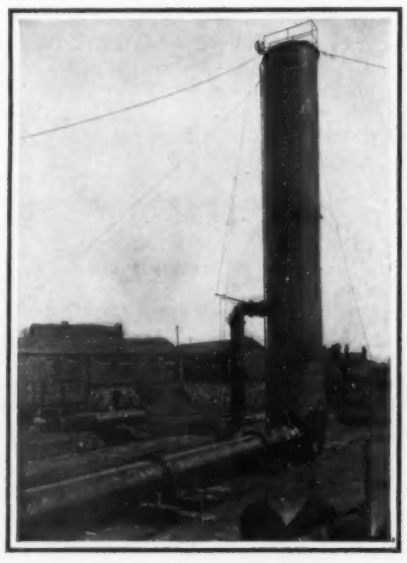
the plant, which differs somewhat from the one we previously published, as certain improvements have been perfected. In this case illuminating gas is to be used, being supplied by the exhibition authorities. The output of the pump is 250,000 gallons of water per hour lifted to a height of 35 feet, but as such a high tower would have interfered with the exhibition crane, the tower height had to be reduced to 24 feet.

Since our description appeared, the pump has been subjected to further tests, and it has been conclusively proved that no other type performing the same work has ever proved so economical in fuel, the plant at Dudley Port now holding the world's record in this respect. Two tests have recently been carried out, the first by Prof. Dr. Eugen Meyer of Charlottenburg and his assistants, and the second by a party of American engineers representing some of the largest commercial interests of the United States. In both cases the gas consumption was equivalent to less than one pound of anthracite coal per water horse-power. Prof. Meyer's tests occupied a week and were exceptionally exhaustive, and he intends at a later date to publish the results in full with the permission of the German interests for which he carried out the work. In this instance the air vessel at Dudley Port, which formerly received the discharge, was replaced by the open-top water tower shown in our illustration.

The pump installed at Brussels is of the four-cycle type, there being a long outstroke of the water column as the ignited gases expand to atmospheric pressure, a short return stroke to expel those products of combustion not already driven out by water which rises in the chamber during the latter part of the first outstroke, a second short outstroke—caused by the expansion of a cushion of compressed air compressed at the end of the return stroke—giving rise to an intake of combustible mixture, and finally the shortest stroke of all, namely, a second return stroke to compress the fresh gaseous charge. The whole operation is purely automatic and controlled by the inertia of the oscillating water column, and the moving parts are practically confined to the admission and exhaust valves and the water suction valves. There is no valve on the delivery of the pump.

The present pump differs from that previously described and tested by Dr. Unwin, F.R.S., chiefly in having the water valve box horizontal instead of vertical; in fact, this valve box now forms the first portion of the discharge pipe, and is placed between the sides of an open top suction tank. With the object of bringing the water discharged by the pump back to the suction tank to be used over again, the discharge pipe is bent round to deliver into a water tower close to the tank and discharging into it through a ring orifice 4 feet in diameter and 1½ inches wide. This arrangement permits the full flow of water being appreciated, as it drops through the air a distance of six feet.

Some idea of the quantity of water delivered by this pump may be obtained when it is recalled that three such pumps would supply all the water used by a city of some 500,000 inhabitants. It is, however, comparatively small beside the double-barrel pump now being designed, and which is to be constructed in Germany. This large Humphrey pump will deliver over a ton of water per second with a lift of 200 feet, and will give 1,000 horse-power in the water lifted. A very



OPEN TOP WATER TOWER INTO WHICH THE WATER IS PUMPED.

high fuel economy is anticipated, and the pump is to be used to demonstrate the utility and economy of the gas-hydroelectric system for central electric stations.

A special point of note in connection with the high-lift, double-barrel Humphrey pump is that the compression pressure given by the return column of water is absolutely under control, and can be made as high as in modern gas engines, and this fact alone will assist in making a still greater economy attainable.

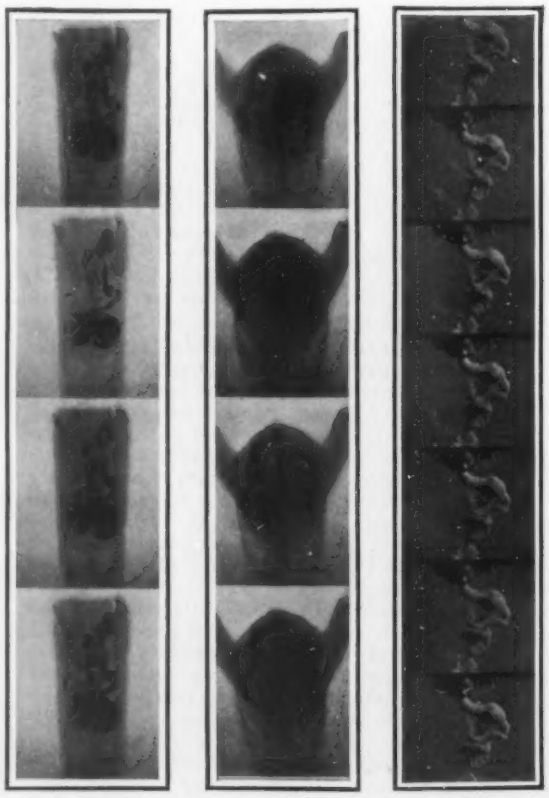
A NOVEL SYSTEM OF X-RAY CINEMATOGRAPHY

BY DR. ALFRED GRADENWITZ

Many scientists have been dealing in recent years with the problem of X-ray cinematography. While a single X-ray picture affords an insight into the interior of the human body, a succession of instantaneous pictures would for the first time yield an absolutely reliable reproduction of the activity of our organs. Unfortunately, all previous attempts made in this direction have proved a failure because of the difficulty experienced in obtaining Röntgen pictures with exposures lasting a fraction of a second; and whenever this difficulty had been overcome, no suitable cinematographic apparatus was available for producing a continuous series of pictures.

The Marey Institute at Paris, which may be said to be the cradle of scientific cinematography, obviously afforded ideal conditions for the solving of the problem. In fact, one of the scientists working at that institute, Mr. J. Carvallo, recently succeeded in illustrating by cinematographic X-ray pictures the process of digestion in warm- and cold-blooded animals. The apparatus used in this connection is rather complicated, and will be briefly described in the following:

The outfit serving to operate the cinematograph is a small motor running at a maximum speed of 2,000 revolutions per minute, but which can be adapted to a number of other speeds of rotation. Its motion is transmitted to the cinematograph either directly through an elastic clutch or through the intermediary of three gearings, allowing the cinematograph to be driven at four different speeds (between 30 revolutions per second and 1 revolution in 15 seconds), while the motor speed is kept constant. Whenever the speed of the cinematograph is to be slackened below the above limit, the motor is operated, not continuously, but intermittently at given intervals ranging between 20 seconds and one hour, to effect which an ingenious contact device has been con-



Cinematograph X-ray pictures of stomach and intestine of mouse.

Cinematograph X-ray pictures of organs of digestion of a chicken.

Movements of the digestion of a frog in isolated digestive tube.

A NOVEL SYSTEM OF X-RAY CINEMATOGRAPHY.

structed. Apart from the saving in current thus obtained, the intervals between pictures are made extremely regular; and as these can be varied at will between 20 seconds and one hour, experiments can be extended over more than a week without any personal intervention or any risk of a hitch in operation.

In the next place, the cinematograph films, 18 to 20 millimeters in length and 35 millimeters (1.38 inches) in width, as generally used, were found to be quite inadequate. Carvallo, therefore, ordered from Messrs. Lumière of Lyons a special film 60 millimeters (2.36 inches) in width and 57 millimeters (2.24 inches) in length, the X-ray sensitiveness of which is increased considerably by the double thickness of the sensitive layer. The most ideal solution of the problem obviously would have been to impart to the cinematograph film a continuous motion in a similar manner as in connection with Lucien Bull's well-known photographs of insect flight. As, however, the discharges of X-ray bulbs are discontinuous, yielding several pictures, and moreover are of variable duration (between 1/200 and 1/500 second), he concluded to adopt the usual intermittent motion of the film (in spite of the obvious drawbacks due to mechanical inertia), being content with 200 to 500 views per second. The intermittent motion of the film is effected by a special clutch, the movements of which are made rectilinear by a lever system.

In addition to this arrangement, the cinematograph comprises a box for storing the film previous to its use and two film rolls. After exposure the film is wound up by a friction roll to a length of 100 meters (328.1 feet). Any disturbing effects of ordinary light are avoided by covering the cinematograph with a pasteboard box traversed in its middle by a pasteboard tube with a fluorescent

(*Concluded on page 247.*)

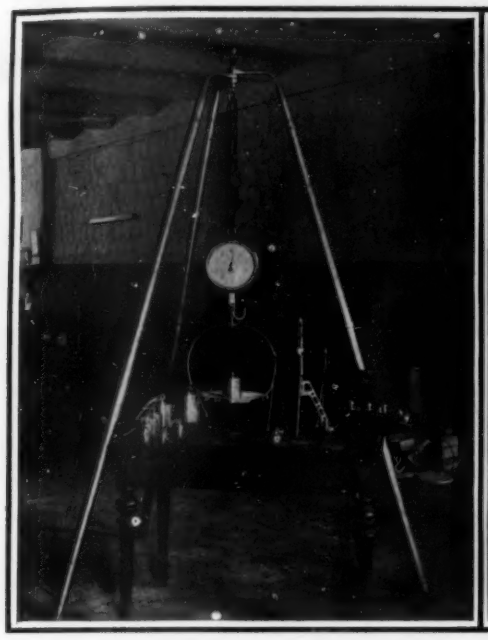
TESTING WEIGHTS AND MEASURES IN NEW YORK CITY

BY HERBERT T. WADE

In the active campaign now being waged to suppress false weights and measures in New York city, considerable interest attaches to the simple but effective testing methods used by Commissioner Driscoll and his inspectors in the Bureau of Weights and Measures. Incorrect and illegal weights and measures and weighing and measuring devices, together with dishonest and illegal methods and customs of buying and selling where the measurement of quantities was involved, had become so widespread in New York that it was realized that active and heroic means must be taken for their suppression. Many customs clearly illegal and fraudulent had become established as trade practices, and were accepted as such without any thought of the underlying fraud and deception involved. Until the recent investigations and raids instituted by the city government, no one, save the city inspectors, realized the extent to which fraud and larceny by the use of incorrect weights and measures were being practised, especially on the poor and ignorant who were the least able to afford or resist such impositions. Such fraudulent and inaccurate weighing and measuring instruments are immediately confiscated and their users prosecuted by the inspectors of weights and measures.

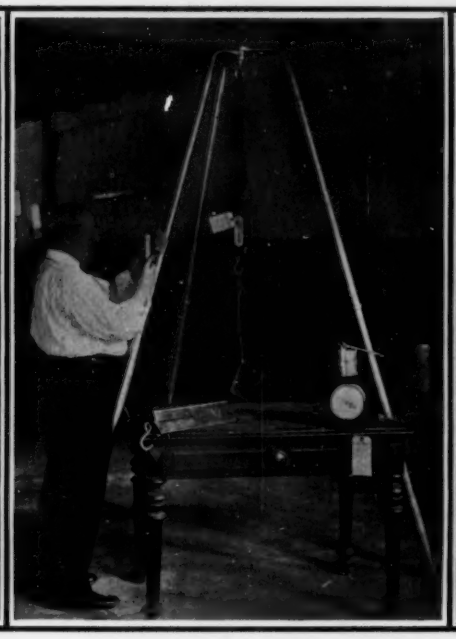
Quite as important an evil, but less sensational, is the general inaccuracy of weights and measures where the criminal intent is not so obvious and the actual damage in an individual case not so glaring, but in the aggregate a matter of even greater seriousness. A noteworthy step forward was taken when an ordinance was passed recently requiring all weights and measures and other weighing and measuring devices sold and used in the city of New York to be tested, sealed and marked by the Commissioner or an inspector of weights and measures. Thus no new inaccurate weighing or measuring device can find its way into use in the city under pain of a serious penalty for the seller, while at the same time those in use can be tested at any time by an inspector and be approved or condemned. This inspection and sealing does not involve high scientific or mere theoretical accuracy, but is intensely practical, with specified limits of toleration of error and prescribed in approved types of weights, measures, and instruments, to which makers and users must conform.

The Bureau of Weights and Measures having outgrown its offices at the City Hall, recently has moved its mechanical and testing departments uptown to a temporary laboratory, where through the courtesy of Commissioner Clement J. Driscoll, the writer was permitted to observe tests of weighing and measuring instruments submitted for inspection and approval.



Testing scales and weights.

Testing a dial spring balance with standard weights. (On the right) Portable balance and standard weights used by inspectors.



Testing spring balances.

A correct spring balance for weighing ice is shown at the left of the table. The others have been "condemned" for faulty design or construction.

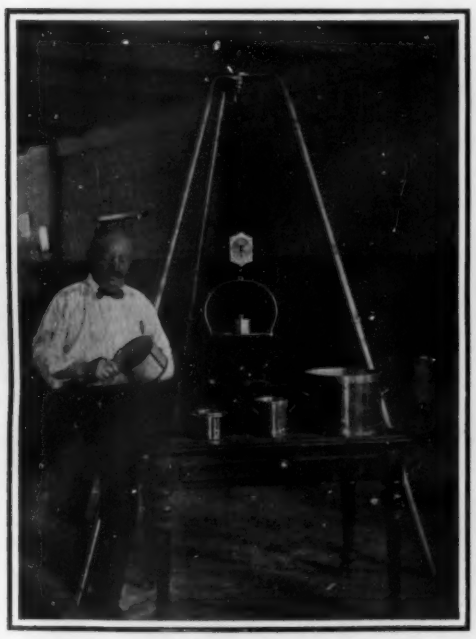
Testing yard sticks.

A yard stick must fit exactly between the end stops of the steel standard. The stick under test is too long and a similar stick is being tagged "condemned."

This work is being carried on at present with inadequate facilities, but a good beginning has been made with the testing and sealing demanded by the new ordinances, in addition to the field work and prosecutions by the inspectors.

The first photograph shows the test of an ordinary butcher's dial spring balance, on the pan of which a correct weight of 20 pounds has been placed. The needle which stood at zero with no weight on the pan, is shown to be somewhat to the right of that mark after 20 has been indicated, and consequently the scale is "fast." The amount of discrepancy in

(*Continued on page 243.*)

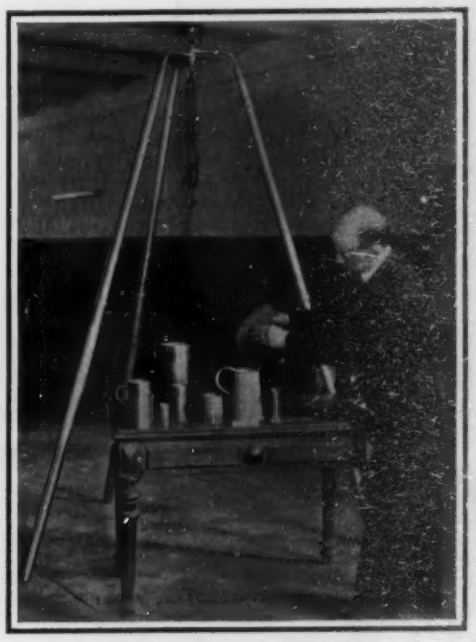


Testing dry measures.

Cylindrical measures of capacity can be gaged by measuring their diameter and depth. Standard dry measures are shown on the table.

Commissioner Driscoll testing a peck measure.

The standard is at the left and has been used to fill the hopper with grain which has fallen into the measure under test. The excess or shortage of the wooden measure is measured by the grain in the graduate.



Testing liquid measures.

One of the brass standards has been filled to the brim and then covered by the brass slicker plate. The contents are poured into the measure being tested, and any excess or deficiency can be measured with the small glass graduate.

TESTING WEIGHTS AND MEASURES IN NEW YORK CITY.

HOW THE CAPACITY OF THE NEW YORK SUBWAY POWER PLANT WAS DOUBLED.

THE TURBINE AS THE COMPLEMENT OF THE HIGH-PRESSURE ENGINE.

Some six years ago, when the Fifty-ninth Street power station, which supplies current for operating the whole of the New York subway, was completed, the huge compound, reciprocating engines with which it was equipped were regarded as being practically the last word in the development of the reciprocating type of engine. At that time they were the largest and the most powerful of their type in existence, if indeed, they do not even yet carry that distinction. Each unit, of which there are nine arranged in one long line down the vast engine room, which is 700 feet in length, consists of two complete engines, coupled to a common shaft in the center of which is the generator. The two cylinders, 42 inches and 86 inches in diameter, are placed at 90 deg. to each other, one being vertical, the other horizontal, and both connect to a common crank shaft. The size of each unit may be judged from the fact that its moving parts alone weigh 210 tons, and the engines together weigh 720 tons. They were run condensing, and each had a maximum economical rated power of 6,000 kilowatts, with an overload capacity of about 8,000 kilowatts. At their normal rating the engines showed a water rate of about 18 pounds of steam per kilowatt hour, and at a maximum overload the consumption ran up to about 22 pounds. This gave a total capacity for the station of 54,000 kilowatts economical, and 72,000 kilowatts overload, the maximum overload capacity for the station being then in round numbers about 100,000 horse-power.

The great increase of traffic in the subway since the day of its opening and the prospect of further enlargements led the Interborough Company to consider the question of increasing the capacity of its power station. In accomplishing this two alternative plans were considered, one being the addition of additional reciprocating units, and the other the installation of low-pressure turbines to operate in connection with the existing engines, taking the low-pressure steam from the low-pressure cylinders and extracting therefrom that recoverable heat energy which was being carried away by the condenser water. The latter plan was adopted, and four of the reciprocating engine units have now been equipped with low-pressure Curtis turbines placed in the position relative to the engine which is shown in our front page engraving.

Although the results secured were not unexpected, having been carefully calculated by Mr. R. J. S. Pigott, assistant engineer of the company, to the layman, and indeed to many steam engineers who have not kept in close touch with the recent developments in turbine practice, they will seem astonishing; for as the reciprocating-turbine units now stand, it has become possible not only to run the engines at an economical water rate at their full overload, but the total output of each unit has been about doubled, the maximum output of the reciprocating engine being now 8,000 kilowatts, and a similar output being shown by its low-pressure turbine.

The steam enters the high-pressure cylinders at a gage pressure of from 190 to 195 pounds; it is delivered to the low-pressure cylinders at from 45 to 48 pounds, and to the turbine at about one pound gage; while the condenser is maintained at a maximum of about 28.8 inches. During the expansion from 195 pounds gage to atmospheric pressure, in the reciprocating engine 8,000 kilowatts is developed, and in the turbine another 8,000 horse-power is recovered in the range between atmospheric pressure and 28.8 inches of vacuum.

Now the significance of these results will be felt when it is borne in mind that before the turbine was added, the reciprocating engines when exhausting direct to the condenser, at their most economical load of 4,600 kilowatts, showed a water rate of 17.1 pounds per kilowatt per hour, and that at maximum overload of 7,500 to 8,000 kilowatts, the consumption ran up to about 22 pounds; whereas the combined reciprocating and turbine unit under its most economical load of 12,000 kilowatts (which is equal to 17,000 indicated horse-power), consumes only 13.2 pounds of water per kilowatt per hour, and under its maximum load of 16,000 kilowatts (equivalent to about 22,500 indicated horse-power), consumes only 14.5 pounds per kilowatt per hour.

The economy in space of the steam turbine as compared with the reciprocating engine is well brought out in our front page engraving, where the height of the turbine and its generator above the engine room floor is only 16 feet 5 inches, as against a height of over 35 feet for the reciprocating engine. The outside diameter of the turbine at the top is 10 feet 10 inches, and at the bottom 14 feet 8 inches. It is significant, moreover, that the turbine proper, in which this 8,000 kilowatts of energy are developed, is contained within a space 5 feet in height, and less than 15 feet in diameter.

In a recent paper, Mr. H. G. Stott, the superintendent of the power station, gave the following summary of the results achieved:

1. An increase of 100 per cent in the maximum capacity of the plant.
2. An increase of 146 per cent in the maximum economic capacity of the plant.
3. A saving approximately of 85 per cent of the condensed steam before return to the boilers.
4. An average improvement in economy of 13 per cent over the best high-pressure turbine result.
5. An improvement in economy (between the limits of 7,000 kilowatts and 15,000 kilowatts) of 25 per cent over the results obtained by the reciprocating engine unit alone.
6. An average thermal efficiency (over the range between 6,500 kilowatts and 15,500 kilowatts) of 20.6 per cent.

We see, then, that by the interposition of turbines between the reciprocating engines and their condensers, not only has the maximum capacity of the whole plant been raised from about 100,000 to about 200,000 horse-power, but the water rate has been cut down from 15.7 pounds to 10 pounds per horse-power per hour.

History of the Vanderbilt Cup Race.

Everyone has heard of the Vanderbilt Cup race. It is America's famous classic—the one race in which the whole general public throughout the country takes unlimited interest. This season's cup race, with its daybreak start, bids fair to outshine all the cup races of the past, both in speed and public interest.

In 1904 William K. Vanderbilt, Jr., America's pioneer motor enthusiast, prompted by a desire to give America a new form of sport and incidentally to give manufacturers an opportunity to improve cars, offered a trophy to be contested for in a race of from 250 to 300 miles on a road course. It was to be competed for by teams of cars from all or any clubs recognized or affiliated with the American Automobile Association, or similarly recognized by the Automobile Club of France, competing as teams and not as individuals. The conditions also specified that in the years 1904 and 1905 the race must be run on American soil, while later it was provided that the contest might be run in the country whose club held the trophy.

Since its inception there have been five great speed contests for the trophy. The prize has played an important part in automobile politics on one or two occasions. Twice the original deed of gift has been changed to make it meet up-to-date requirements, and in 1908 the custody of the trophy was turned over to the Motor Cups Holding Company, together with the Grand Prize Cup of the Automobile Club of America, and the Motor Cups Holding Company has since promoted the cup races.

As many motor enthusiasts will recall, the first contest took place October 8th, 1904, on a circuit in Nassau County, with sixteen contestants starting. These were composed of teams representing the United States, France, Germany and Italy. It was won by George Heath, driving a 90 horse-power Panhard car. Heath was an American amateur, driving as a member of the French team, and he covered 284 miles at an average speed of 52 miles an hour. Tart, in another Panhard, however, did several laps at a much faster rate, skirting one at a speed of 71 miles an hour—sensational, indeed, for those days. America showed third at the finish, with Herbert Lytle in a Pope-Toledo. The initial contest was a success in every way, and certainly acted as a stimulus for makers to improve the manufacture of cars on this side of the Atlantic.

When the second Vanderbilt race was run, the next autumn, an elimination race was necessary in order to select an American team, Bert Dingley being the winner of the trial. In the final, teams of five cars each represented America, France, and Italy, while Germany had but four. A second triumph was scored for France by Hemery in a Darracq, when he drove in a winner at an average speed of 61½ miles an hour, materially better than the time of Heath the year before. In this contest Heath was second and Tracy, in the Locomobile, third. Upon this occasion, Lancia, the famous Italian driver, piloted one of the greatest races in history, prior to his unfortunate smashup with Christie.

France scored its third triumph in the Vanderbilt race in 1906. On October 10th, an American team of five cars (picked after an elimination trial, in which Tracy was first), one of the best of the cup races took place. The exciting finish, with its battle between Lancia, in the Fiat, and Wagner, in a Darracq, will never be forgotten by the thousands who witnessed it. These two drivers, together with Duray and Jenatzy, had been going with but a few seconds' difference in their elapsed times for some laps. In the tenth and last Wagner took the lead, only to meet with tire troubles a couple of minutes later. There was a frenzy of excitement; the crowds tore down the wire fences and swarmed over the course, and it seemed as if they could not avoid being mowed down by the fast machines. Down the stretch came Lancia, snorting across the tape, the first to finish the distance. Wagner, however, was going again, and as he had started several minutes behind Lancia, still had a chance to win in elapsed time. Everyone wondered if he would cross the tape before it was too late. He did—in a whirlwind finish, too! Wagner's speed was about 63 miles an hour for the 297 miles. Tracy, in an American Locomobile, scored the fastest lap of the event.

There was no cup race in 1907, the fourth taking place on October 24th, 1908, with drivers competing as individuals and not as teams. The big, memorable feature of this contest was that for the first time the famous trophy was brought back to America, and it was George Robertson, in the 90 horse-power Locomobile, who performed the feat. Robertson's duel with Lytle, in the Isotta, toward the finish was thrilling. The Locomobile's average speed was 64.3 miles an hour, the fastest ever made in a cup race.

Last October's cup race was in the form of a sweepstakes, the Wheatly Hills event and the Massapequa sweepstakes for cars of smaller cylinder dimensions taking place simultaneously with the Cup race. As in the 1908 event, contestants competed as individuals. This fifth Vanderbilt race saw Harry F. Grant come out the victor in his 6-cylinder Alco, winning in a field of fifteen starters. Grant covered the 22 laps, or 278.08 miles, at an average of 62.8 miles an hour, slightly slower than Robertson's record the previous year. Edward H. Parker, in a Fiat, scored second place. Harroun, driving a Marmon, won the Wheatly Hills Sweepstakes, and Matson, in a Chalmers, the Massapequa event.

Although the race was fast, it was noticed by everyone that the contest, starting as it did at 9 A. M., did not furnish as impressive a spectacle as the former races, which began at daybreak. For this reason this season's event will return to the old custom of starting around 5 A. M.; and with a larger field of contenders than ever before, including some of the fastest cars that have ever been built, and many of the foremost drivers, this autumn's contest should prove the most interesting cup race ever run.

For the first time in the history of the Vanderbilt Cup race the West will be well represented by drivers who have achieved fame on the Pacific Coast. Realizing that the sixth Cup race will eclipse all former struggles, the Western drivers have made a great effort to come East and participate in the great event October 1st. The latest to enter the list is Harris M. Hanshue, of Los Angeles, Cal.

William K. Vanderbilt, Jr., president of the Motor Cups Holding Company, has just announced the entry of an Apperson "Jack-Rabbit," entered by George H. Strout. Hanshue has been picked to pilot it.

Others from the western slope of the Rockies are Al. Livingstone, the National pilot, winner of the Illinois trophy; Bert Dingley and Jack Fleming, the Pope-Hartford team, who made big names for themselves on the Coast; Bill Endicott, who has won so many light car races with the Cole "30." The Middle West will also have a large representation in Edward A. Hearne, Robert Burman, Ray Harroun, Joe Dawson, Jack Aitken and others. Hence the race is more truly national in scope than ever before.

Formal Garden Number of American Homes and Gardens for October, 1910.

The October number will be one of the most attractive and practical that we have published.

It will be devoted mainly to the "Formal Garden," but will comprise other features of importance that need be only named to enable it to be anticipated with more than the usual interest.

One of the important articles is by the well-known landscape architect, Charles Downing Lay. It is on the proper planting of a formal garden, and is rendered with elaborate plans and intimate detail descriptive matter. Other articles include "The Kinds of Bulbs to Plant in the Autumn," by S. Leonard Bastin; "Sundials," by A. J. Squire; "Topiary Art," by A. Jennings Brown.

While considerable space is given to the "Formal Garden," the building and the furnishing of the home have not been neglected. An article appears on the "Fireproof House, from an Artistic Point of View," by Edith Haviland, and another on "Decorations and Furnishings for the Home," by Alice M. Kellogg. These are only a few of the many contributions to this issue.

An American patent issued to Mr. W. A. Layman covers an improvement in the Wagner type single-phase motor. The rotor is provided with two windings and two commutators. When starting, the brushes on the main winding are short-circuited in the usual way, and those of the auxiliary winding are connected in series with the main field winding. When up to speed, the main rotor winding is short-circuited, and an auxiliary compensating winding on the stator is connected in shunt with the auxiliary rotor winding. The purpose of these auxiliary windings is to increase the starting torque and improve the power factor, both at start and when running.

Correspondence.

THE ARGENTINE BATTLESHIPS AND THE UNITED STATES STEAMSHIP "WYOMING."

To the Editor of the SCIENTIFIC AMERICAN:

The articles in your issue of August 27th, comparing the Argentine and American Dreadnoughts, contains some erroneous statements in regard to the Argentine ships which call for correction:

GREATER ALL-ROUND VOLUME OF FIRE.—Under this heading we note your statements that the echelon arrangement of waist turrets is attractive on paper, but that the angles of fire on the opposite side of the ship are disappointing, and that the gain in bow fire is less than the plan shows.

In connection with the above and the diagram to which you refer, and as indicated in your article, since turrets Nos. 2 and 5 have an arc of fire of 60 deg. abaft and forward of the beam, respectively, instead of 45 deg. indicated on the diagram, and that turrets Nos. 3 and 4 have a cross-deck fire of 50 deg. forward and 50 deg. abaft, instead of 60 deg. and 40 deg. as indicated, it will thus be seen from a correction of the diagram that the broadside fire, the ahead fire, and, in general, the all-round fire of the ship is superior in all points to that of the "Wyoming," which will enable the greatest number of guns to bear upon an object with the least maneuvering of the vessel, which is considered by eminent naval officers to possess the highest military value.

COMPARISON OF GUN HEIGHTS AND FREEBOARD.—The total fuel on the Argentine battleship is some 1,600 tons in excess of that provided for in the "Wyoming," whereas the normal supply to each of the vessels is practically the same, and the corresponding displacements on the two vessels include the same number of rounds of ammunition for the 12-inch battery, and increased number of rounds per gun for the 6-inch gun over the 5-inch guns and a very large supply of ammunition for the 4-inch guns, making the total amount of ammunition carried on the Argentine battleship in excess of that carried on the "Wyoming." Consequently, as a fair comparison, the normal line of the two ships should be considered when comparison is made as to the relative heights.

The freeboard and gun heights of the Argentine battleship are as follows:

	Ft.	In.
Forecastle	25	4
Midship	21	11
Aft	16	9
Turret No. 1	31	6
Turret No. 2	39	4½
Turret No. 3	31	6
Turret No. 4	31	6
Turret No. 5	31	6
Turret No. 6	22	4

It will thus be seen, reducing the two ships to the same basis, that there is a decided advantage in favor of the Argentine vessel.

BETTER PROTECTION.—Main belt 10 feet 10 inches in width, of which 5 feet 10½ inches is below and 4 feet 11½ inches above the normal water line. This belt is uniform in thickness for 12 inches, extending from the top of the belt to 3 feet 3½ inches below the water line, or a total depth of 8 feet 6 inches, tapering from this to the bottom, to 5 inches. This belt extends over the machinery spaces a distance of 248 feet; forward of this, for a distance of 80 feet, and aft, for a distance of 68 feet, the belt is reduced to a thickness of 10 inches and 5 inches at the bottom, in the same manner as for the 12-inch belt. Forward of this main belt, running completely to the stem, is a belt of armor extending from the armor shelf to the gun deck in thicknesses of 6 inches, 5 inches, and 4 inches. Aft of the main belt, continuing to the armor bulkhead abaft the steering engine spaces, an armor belt of 4 inches extends from the armor shelf to the gun deck.

UPPER BELT.—This belt is 9 inches in thickness at the lower edge, tapering to 8 inches at the top, and extending from the top of the armor belt to the upper deck for about 400 feet in length.

CASEMATE ARMOR.—Six inches in thickness, backed by splinter bulkheads on either side of 1½ inch in thickness, and in addition to which the smokestacks are further protected by 1½-inch armor, extending to 15 feet above the upper deck.

PROTECTED DECK.—The thickness of the deck on the flat is the same in both vessels. However, the Argentine battleship has a sloping protective deck, the thickness of which is 2 inches, affording better protection to the vitals of the ship than is obtained by the flat protective deck, where the side armor is the only means provided, as on the "Wyoming."

TURRETS.—The thickness of the armor on the turrets of both vessels is practically the same, the Argentine battleship being fitted with turrets of design in general as on the "Wyoming" class.

BARBETTES.—Argentine battleship, 9 inches. The vital difference referred to in the article is not correct, since protection is provided for all the turret supports and loading arrangements in a manner adopted by Great Britain and other naval powers.

UNDER-WATER PROTECTION.—Protection for the magazines is provided for in substantially the same manner as followed on the "Wyoming," and in addition to which, the machinery spaces are protected by a longitudinal armor bulkhead, in place of a light structural bulkhead on the "Wyoming," and by an armored flat placed well above the inner bottom of the vessel, which does not obtain at all in the "Wyoming." Additional protection is provided by torpedo nets extending practically the full length of the vessel. Further protection is provided by means of a 1½-inch armored superstructure deck over the 6-inch battery and from the transverse armor of the upper casemate to the transverse armor of the lower casemate on the upper deck, of 1½ inches in thickness, and from the lower casemate armor bulkheads to the extremities of the vessel on the gun deck, of 1½ inches in thickness.

The above protection is all in excess of that provided on the "Wyoming."

CONNING TOWERS.—One forward and one aft, as referred to in your article, in addition to which there are four armored fire-control stations, two of which will be fitted with revolving tops for the installation of range finders. These fire-control and range-finding stations are not fitted on the "Wyoming."

SPEED.—The Argentine battleship was designed for a speed of 22½ knots on the normal draft, which, as before mentioned, is on practically the same basis as the "Wyoming;" and in view of the fact that this 22½-knot speed is obtained while working under a pressure in the firerooms not exceeding one inch, which limits the amount of coal burned per square foot of grate surface, whereas on the "Wyoming" the trials will be conducted at a pressure much greater than this, it can be readily seen that there is a greater margin under the same condition of working in the Argentine battleship than in the "Wyoming."

RADIUS OF ACTION.—By reducing the supply of fuel on the Argentine battleship to correspond to that given in the article as carried on the "Wyoming," the respective drafts of the vessels will be 29 feet 8 inches for the "Wyoming," as compared to 28 feet 8 inches for the Argentine battleship. The steaming radius at 10 knots speed in both cases will be practically the same; but on account of the greater stowage space provided for the carriage of fuel on the Argentine battleship, it possesses, without question, a decided advantage.

In conclusion, it is apparent that the Argentine battleship has the following advantages:

First.—Greater arc fire of 12-inch battery.

Second.—Higher level of guns on direct comparison.

Third.—Better protection.

Fourth.—Higher speed.

Fifth.—Greater stowage capacity for fuel.

While the "Wyoming" class of vessel was passed upon, as stated, by the seagoing officers of the U. S. navy, it is well to remember that the Argentine battleship comprises the thought and experience of the principal naval powers in the world, and without question is the most powerful and best-protected vessel designed up to the time at which she was ordered.

New York, N. Y. NAUTICUS.

Finish of the Harvard-Boston Aviation Meet.

The last five days of the Harvard-Boston Aviation Meet, the first part of which was described in detail in our last issue, resulted in the breaking of but one world's record, although a new American duration record was obtained. Both these records were made by Ralph Johnstone in his Wright biplane. The first one was for accuracy in alighting, the distance of his seat from the flag being but 5 feet 4 inches; while the second, for duration and distance, was a flight of 101 miles 389 feet in 3 hours 5 minutes and 40 seconds. This corresponds to a speed of 32.66 miles an hour. The only other world's record made at this meet was the slow-speed record of Brookins recorded in our last issue (13 minutes and 48 seconds for three laps, or 5¼ miles). This corresponds to a speed of but 22.85 miles an hour—a new world's record for slow flying.

On Saturday, September 10th, Walter Brookins made an effort to break his Atlantic City height record of 6,175 feet. He reached an estimated height of but 5,300 feet, however. In the same machine, later in the day, Johnstone made an endurance flight of 2 hours 3 minutes 5 2/5 seconds, during which time he covered a distance of 62 miles 3,765 feet. Despite his inability to get his machine prepared until late in the afternoon, Mr. White secured the second place in the altitude, duration, and distance events for this day. He ascended to a height of about 2,500 feet, and flew for 1 hour 12 minutes 1 3/5 seconds. Brookins made a record for accuracy for alighting on skids by stopping his machine within 12 feet 1 inch of the flag.

The chief event of Monday, September 12th, was the magnificent flight of Grahame-White to the Boston Light and back, twice over. This was the second time he had made the daring flight for the Boston Globe's $10,000 prize. As before, he used his racing Bleriot monoplane, and succeeded in clipping 7 minutes 24 seconds from his former time for the 33 miles. He covered this distance in 34 minutes 11 seconds, or at the rate of practically 58 miles an hour average speed. When deductions are made for the turns, it can be seen that he in reality made over a mile a minute.

This day was noteworthy also because of the two records for duration and accuracy in landing made by Johnstone and mentioned above. At one time four machines were seen in flight simultaneously. Glenn Curtiss failed to obtain the fastest speed with a new 8-cylinder 65-horse-power Indian aeronautic motor, which he had fitted in his machine with the intention of trying to beat Grahame-White in the flight to the Boston Light. He succeeded in covering 5¼ miles (three laps) in 7 minutes and 3/5 of a second, an average of but 44.93 miles an hour. As this was so much slower than the speed of White's Bleriot machine, Curtiss did not attempt the flight to the light-house. The next day he removed the new motor and reinstalled his own.

The last day of the meet (as far as official results are concerned) was given up chiefly to the attempts of the Wright aviators aided by Wilbur Wright himself to beat Grahame-White at bomb dropping. Mr. Wright went up in the passenger seat of Brookins's biplane, and tried dropping two or three plaster bombs at a time as he passed over the warship. The results of this contest showed that in nine trials Wilbur Wright scored 14 points against Grahame-White's 51 points with the use of thirty bombs in a flight lasting 34 minutes 13 3/5 seconds. The latter's total score in this contest in the meet was 180, against 93 points for Brookins, 24 for Johnstone, 27 for Curtiss, and 12 for Willard. In the speed tests Grahame-White scored 15 points, against 11 by Curtiss and 8 by Willard. His best time was 5¼ miles in 6 minutes and 1 second. The altitude contest was won by Brookins. He scored 15 points as against 12 by Grahame-White and 2 by Johnstone. The latter won the distance and duration events, scoring 13 points in each, as against the 11 and 8½ points of Grahame-White. The totals for the meet were as follows: White, 226½ points; Brookins, 111; Johnstone, 52; Curtiss, 38½; and Willard, 21. The best accuracy and alighting record for a machine mounted on wheels was 33 feet 4 inches, scored by Grahame-White, who also started quickest in 26 feet 11 inches.

On account of the great popularity of the aviators, the meet was extended two days, and some new prizes were offered. One of these, the Commodore Barry trophy, donated by Mr. John Barry Ryan, of New York, was for accuracy in dropping bombs from an altitude of 1,500 to 1,800 feet. The last day of the meet experiments were made at dropping eggs from this altitude. Ralph Johnstone succeeded in landing three eggs within 180 feet of the target from this great height. This was doing very well in view of the fact that there was a strong wind blowing and that it was difficult to gage the trajectory of the eggs dropped from this height. Mr. A. V. Roe brought out his second triplane (which he constructed for the Harvard Aeronautical Society) on the last day. He made a short flight against the wind successfully, but, in turning, his machine was tilted at a sharp angle, so that it slid sideways to the ground and was badly smashed. The next to the last day of the meet, September 14th, was given up to fancy exhibition flights by the Wright aviators and passenger carrying by Mr. White. Walter Brookins apparently turned his Wright biplane completely on end in making some of the sharp turns for which he is noted. He took such chances that Wilbur Wright ordered him to desist. The last day, September 15th, Johnstone took Mr. R. V. Martin, the secretary of the Harvard Aeronautical Society, for a flight of about 10 minutes' duration. In the course of this flight he made some sharp turns and sudden dips. Mr. Martin expressed himself as delighted with the sensations experienced in his first flight in a Wright biplane. He noted especially the perfect control of the aviator at all times.

The crowning event of the last day was a race for a $3,000 prize between White and Curtiss. Just at sunset Mr. White brought out his Bleriot monoplane, and began circling the course at a 60-mile clip. Curtiss was soon in the air also, and a pretty race between the two types of aeroplanes was run off. The small Bleriot monoplane was an easy winner, although its power and weight were practically the same as the power and weight of the biplane. The times were 5 minutes 47 4/5 seconds and 6 minutes 4 3/5 seconds, respectively. These figures correspond to average speeds of 54.34 and 51.83 miles an hour. The diminutive, bird-like monoplane with its flat wings having only 120 square feet of supporting surface, readily bested the biplane on account of the greater head resistance of the latter, owing to its more numerous guys and struts. The outcome of this race makes America's chances in the Bennett trophy race on October 29th next seem slim, since France and England are sending over three monoplanes, each driven by skilled professional pilots, whereas America has none.

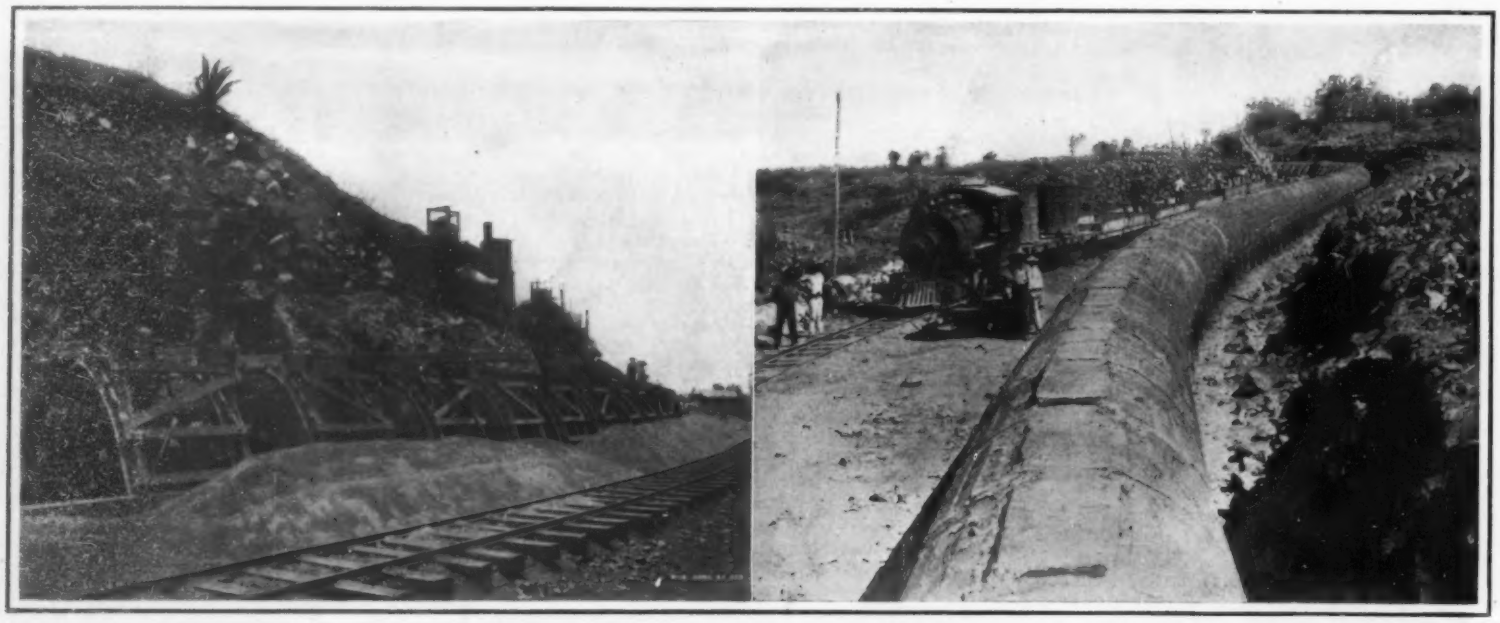
MEXICO CITY'S NEW WATER WORKS SYSTEM

BY ROBERT H. MURRAY

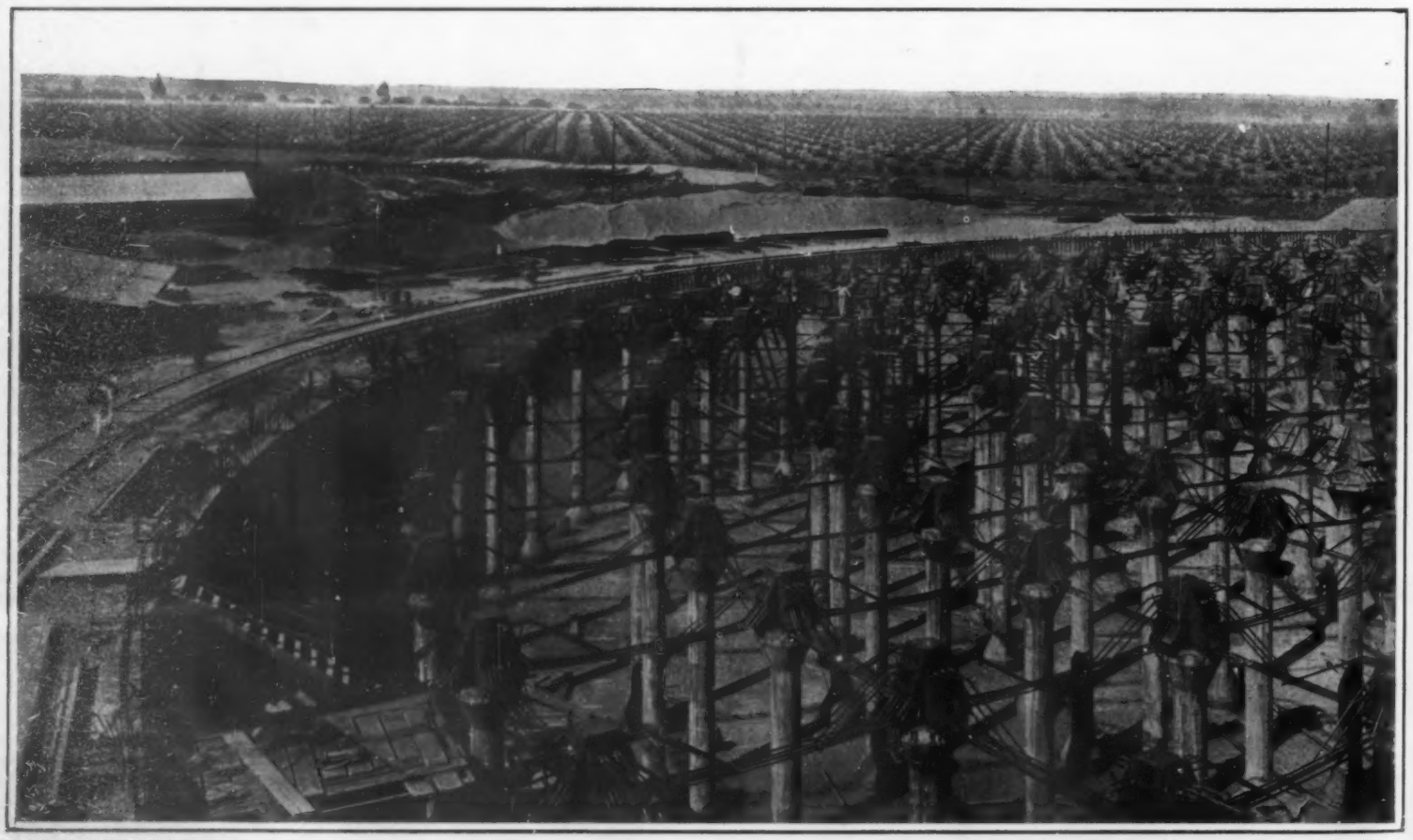
Chief among the numerous public works which will be dedicated during September in Mexico, in connection with the celebration of the centennial of the independence of the republic, is the new water works system for the city of Mexico. Both in volume and quality the water supply of the capital for long has been inadequate, and not wholly satisfactory from a hygienic standpoint. Springs at the base of the Chapultepec elevation, in the western outskirts of the city, which is crowned by the historic castle of that name, and other springs in the same vicinity, have for centuries been depended upon for the bulk of the potable water consumed in the city. The rapid increase in population—Mexico city's inhabitants now number close to 400,000—and the growing necessity of safeguarding the public health, forced upon the authorities of the Federal District the problem of gaining a supply of water not only sufficient to meet the current consumption, but ample enough to take care of the future demands of the city for a period of years to come. The matter was placed in the hands of a board, headed by José Yves Limantour, the Minister of Finance, with Manuel Marroquin y Rivera, an eminent Mexican engineer, as technical director. Mr. Marroquin has had entire charge of the planning, designing, and construction of the system, which was begun five years ago. The work will not be completed for two years, although the bulk of the construction is now finished. A part of the new supply is at present available in some quarters of the city.

The system consists: First, of the supply wells, which will yield a continuous flow of 2,000 liters of water per second; second, a reinforced concrete conduit about 30 kilometers long, in which the water is conveyed from the springs to the city; third, four covered distributing reservoirs; fourth, five pumping plants, four of which will be used for forcing the water into the conduit, and the fifth for raising the water from the conduit to the reservoirs; and fifth, a new system of distribution pipes in the city.

Underlying the surface at the foot of the Ajusco Mountains, which border the valley of Mexico on the south, is a huge basin of artesian water. These waters bubble to the surface at four springs, close to the shores of Lake Xochimilco, the flow of which has been increased by sinking wells in each of the springs. The volume of water available is in excess of 2,500 liters per second, but for the present only 2,000 liters of this will be utilized. It is estimated that this rate of supply will afford 100 gallons of water per capita for a population of 600,000, or more than 200,000 in excess of the present population of the city. The level of the springs is virtually the same as that of the city, which renders it necessary to lift the water to a



The forms and steel reinforcement of the concrete conduit. The main conduit which extends for 30 kilometers from the springs to the city.



View from above, showing columns and steel reinforcement of roof in place ready for concreting.

MEXICO CITY'S NEW WATER WORKS SYSTEM.

height, whence it may flow by gravity to the pumping station below the reservoirs. The lifting head of the pumps at the springs varies from 6 to 12 meters.

The conduit is circular in form, and ranges in diameter from between 4½ to 6 feet. It has a capacity, calculated according to Kutter's formula, for a grade of 0.0003. It has ventilating chimneys and control gates at a uniform spacing of 333 meters for its entire length. The latter are to be used if it is necessary to repair the conduit, or to isolate any section from the remainder. Immunity from freezing—in the latitude of Mexico city it seldom freezes—made it possible to locate the conduit wholly above ground.

In planning the conduit, as well as the city distributing system, Mr. Marroquin was obliged to make provision against the liability of damage and breakage, due to the frequent earthquakes which agitate the soil of the valley of Mexico. Flexible joints were devised, which are calculated to give the sections sufficient play at the points of juncture to preserve the conduit intact through the most violent seismic disturbances.

There are two centrifugal pumps, driven by electricity, at each of the four pumping plants at the springs, and three centrifugal pumps, similarly operated, at the city end of the conduit for forcing the water into the reservoirs.

Each of the four circular reservoirs, which stand 50 meters above the level of the city, is 100 meters in diameter, and with a capacity for storing 50,000 cubic meters of water. The combined capacity of the four is equal to a thirty hours' supply. The roofs of the reservoirs are formed of concrete girders and slabs, supported by reinforced concrete columns.

Connecting the four reservoirs to a gate chamber, which controls the supply to the city, are reinforced concrete pipes 1 meter 50 centimeters in diameter. The ground about the reservoirs will be parked, and joined to the park of Chapultepec, the principal pleasure ground of the city.

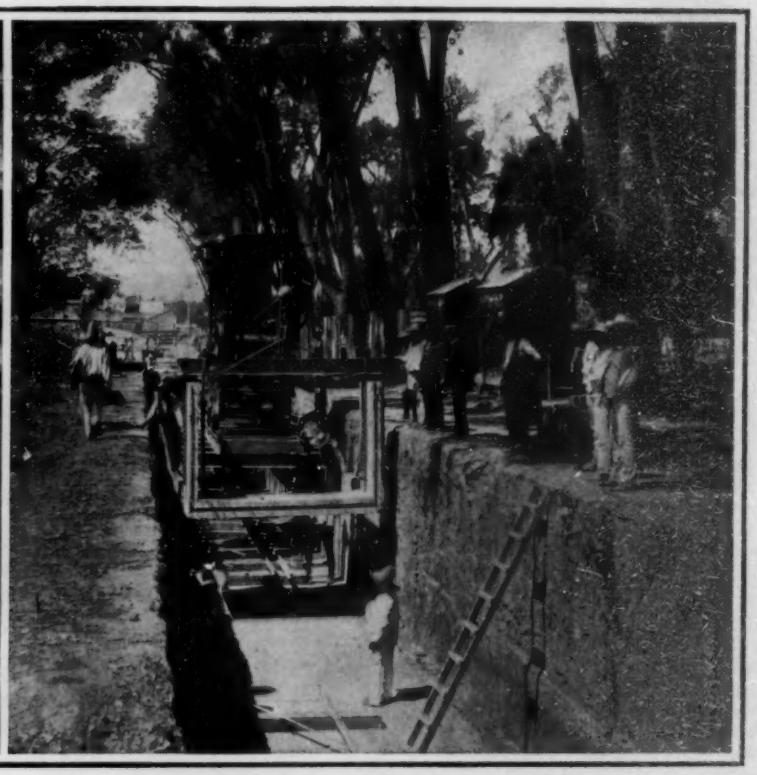
From the gate chamber has been constructed through the city from its western to its eastern extremity a square, reinforced concrete subway, about 6 feet wide. In this will be laid the main distributing pipes, and space has been reserved for telephone, telegraph, and electric light and power wires. Various innovations in construction were applied to the building of the subway, which made for rapidity of construction and a lessening of the duration of interference with street traffic. The sections of the subway, minus the tops, were molded at the city's plant outside of the city, and kept there until the ground was excavated and made ready for their reception. They were then transported as needed on tramways and placed in position. The concrete slabs for the tops were laid on, and the surface soil and paving was immediately replaced. While the subway was being built it was possible, within the space of a city square, to view a section of completed work, other sections of concrete being placed in position and excavations under way for reception of other sections.

The eastern extremity of the subway connects with the main drainage canal of the city. If the water mains in the city should break, or be ruptured by an earthquake, the escaping water would find its way into the canal without tearing up the surrounding soil, or damaging the foundations of the adjoining buildings.

In the city 48 miles of six-inch pipe will be laid, weighing 35,000 tons. Strict economical measures in purveying the water will be instituted. The water furnished to each consumer will be metered. For the present 20,000 meters, of American manufacture, will be used.

All of the work in connection with the new system has been done by the government. The saving in this method, over what it would have cost had the job been let by contract, is estimated at not far from $800,000 gold. The cost of the entire system, including the re-piping of the city, will amount to about $9,000,000 gold.

Interior of one of the four 50,000-cubic-meter storage reservoirs of the new water works of Mexico city.



Constructing the city subway of sections which were molded at a distance and brought to the city and erected in an open excavation.

MEXICO CITY'S NEW WATER WORKS SYSTEM.

Dew with a Cloudy Sky.

Dr. J. R. Sutton, director of Kenilworth Observatory, at Kimberley, South Africa, has made a series of observations on the formation of dew, the result of which is to clear up a prevalent misapprehension as to the relation of this process to the state of the sky.

The statement that dew cannot form under a cloudy sky is met with in many generally trustworthy treatises on meteorology, as shown by the following quotations:

"It is observed that dew is never copiously deposited in situations much screened from the open sky, and not at all in a *cloudy night;* but if the clouds withdraw even for a few minutes, and leave a clear opening, a deposition of dew presently begins." (J. Herschel, "Preliminary Discourse on the Study of Natural Philosophy," 1831, p. 162.)

Dew "is never deposited in cloudy weather; and so strict is its connection with a *clear sky* that its deposition is immediately suspended whenever any considerable cloud passes the zenith of the place of observation." (J. Herschel, "Meteorology," 1862, Art. 91. The italics are Herschel's in both quotations.)

"Dew is deposited over the earth's surface on comparatively clear and calm nights. . . . Dew is not deposited in cloudy weather, because clouds obstruct the escape of heat by radiation." (A. Buchan, in art. "Meteorology," Encyc. Brit., 1878.)

"It is known to everyone that dew does not appear on a cloudy night." (R. H. Scott, "Elementary Meteorology," 1893, p. 117.)

"Dew may be defined as moisture deposited when visible cloud is absent." (W. Allingham, "Manual of Marine Meteorology," 1900, p. 149.)

In contradiction of the above, the fact that dew may, and frequently does, form under a clouded sky has been pointed out by a multitude of writers; notably Harvey and Tyndall. For a correct statement of this matter one should turn to Hann's conservative "Lehrbuch der Meteorologie"—the court of last resort on all meteorological questions—where we are told that "on cloudy nights, and especially when the clouds are low, dew *may* fail to occur, especially with a dry air and strong winds." (The italics are the present writer's.)

The following is an abstract of the results of Dr. Sutton's investigations, stated in his own words:

"A clear sky is only favorable to dew-making when other conditions remain the same. That is to say, let the temperature of the air and of the dew-point at sunset be respectively the same on any two evenings; then if one of the evenings be clear and the other cloudy, the former will show, to begin with, the more rapid rate of dew-formation. But the point to be taken into account is that in nine cases out of ten the dew-point is higher on the cloudy night than it is on the clear night, and hence that the temperature of the air has not so far to fall to the saturation-point, so that, although the clouds do considerably check the radiation of heat from the earth's surface, yet, on the other hand, no great intensity of radiation is required in order that the lower air may cool sufficiently to allow its excess of moisture to be condensed. This fact is very well exemplified by the observations of dew made at Kimberley. It is not in the clear, bright, calm nights of the Kimberley winter that the most dew (or frost) is deposited, but rather in the relatively more clouded autumn. My own observations go to show that on a clear, damp night a great deal of dew is made in a short time, but that the energy of the dew-making process soon diminishes, largely, perhaps, because the high and increasing relative humidity of the layer of air in contact with the surface hinders a continuous rapid fall of temperature, and partly, perhaps, because of the high specific heat of water. On a night when there are clouds, however, the rate of condensation may be less rapid; yet there are times when as much dew is deposited in the long run, in spite of the clouds, as in the former case when the sky is clear.

"I have not yet been fortunate enough to observe the rapid alternations of condensation and evaporation, as clear sky has alternated with clouds, which seem to have been observed by others. Nor have I ever seen any pronounced rise in the reading of a radiation thermometer lying on the grass (and concomitant evaporation of dew), which could be ascribed solely to the influence of a passing cloud. In my experience there is only one meteorological factor competent to produce a great and sudden rise of temperature at night, and that is a gust of wind, disturbing an evening calm. The gust almost invariably checks the formation of dew, and if it continues long enough evaporates what is there. I have never seen a cloud alone do this."

MAGIC FOR AMATEURS—XI

MISCELLANEOUS TRICKS

BY W. H. RADCLIFFE

NO. 25. DRAWING CARDS BY WILL POWER.

To make a person draw the cards you call for, ordinarily requires a full set of well developed muscles. To do the trick by will power as here described is usually much easier and is far more interesting and perplexing to the spectators.

Take a full pack of cards, have them shuffled and cut, and then spread them out face downward upon a table without entirely separating them. Before spreading them out glance at the bottom card and remember what it is.

Explain to the spectators that you will now ask one of them to draw from the pack certain cards, the faces of which neither you nor he has seen, and to hand them to you. Tell him that by forcing your will power over his, you will cause him to draw the cards you ask for, and in the end will prove that he has done so if some one will write down the names of the cards requested.

Supposing the bottom card is the nine of spades, you call for this card. He may hand you the four of clubs. You look at it and confidently call for the four of clubs, he not knowing that you already have it. If for this he hands you the queen of diamonds you call for the queen of diamonds, and so on until six or eight cards have been drawn. Supposing the eighth or last card he hands you is the five of clubs, you say: "The last card I want is the five of clubs, and this I shall will myself to find."

Commence shuffling among the cards on the table until you reach the bottom one, which is the nine of spades. Place this card at the bottom of the cards you hold and you can show all of them in the order in which they were requested.

NO. 26. THE CONJURER'S PACK.

Perhaps the most spectacular card trick for the amount of skillfulness required is the one here described. The performer hands the audience a pack of cards to be shuffled and cut. Upon receiving them back he casually glances at the bottom card, which let us suppose is the queen of spades. Then facing the audience he holds them behind him in his left hand, and with his right hand turns the bottom card face upward to the top of the pack as indicated in Fig. 40.

Holding up the cards in front of him in his left hand with the face of the pack toward the audience, the performer claims that he can see directly through the pack so as to read the cards on the further side. "The card now facing yo:, ladies and gentlemen, is the queen of spades," exclaims the performer. Saying this, he glances at the nearer side of the pack as he holds it up in line with his eyes and the audience, and notes the next card to be turned over.

Again holding the pack behind his back he turns the bottom card to the top as before and repeats the reading process. After eight or ten cards have thus been treated, the trick may be varied somewhat by the performer giving an exhibition of his "sensitive card touch," claiming that he can pick out any card in the pack solely by the sense of feeling. Remembering

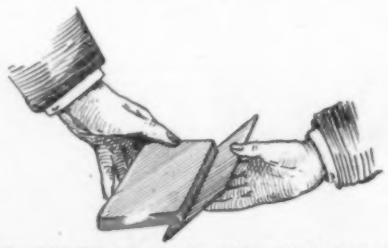


Fig. 40.—BEHIND HIS BACK THE PERFORMER TURNS THE UNDER CARD ON TOP TO BAFFLE HIS AUDIENCE.

the bottom card to be turned over, he exclaims, "Here I call for"—mentioning the name of the bottom card. After turning the card over, the pack is held up as before and the performer gets his tip as to which card to call for the next time.

If all the cards in the pack are manipulated as just described, for either or both methods of procedure, they will at the close all be facing in one direction, and the pack may be handed out for examination. Otherwise, the pack should not be handed out, as the reversed arrangement of the cards would probably disclose the secret of the trick.

NO. 27. A BIRD ENGIMA.

An optical illusion of more than passing interest can be provided and attributed to magical influences by drawing upon a sheet of paper a bird cage and a bird, with a dotted line between them, as illustrated in Fig. 41.

Show the sketch to the spectators and call attention to the cage being empty and to the bird being some distance from it. Then take an ordinary visiting card and, touching it with your wand as if to impart to it the necessary magical influence, claim that it has the power of enabling anyone who looks at the sketch to see the bird enter the cage.

Request the spectator who wishes to see the trick

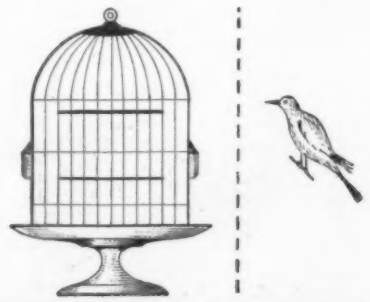


Fig. 41.—THE BIRD WILL BE SEEN TO ENTER THE CAGE WHEN THE TWO ARE SEPARATED BY A CARD.

to hold the card perpendicular to the paper along the dotted line and so that the light does not cause the card to cast a shadow upon the paper. With the end of his nose against the edge of the card, have him look with both eyes at the cage and the bird.

At first he will see the bird and cage separately, but as he looks the bird will appear to move and enter the cage, finally occupying a permanent position within it.

The effect should be attributed by the performer to the magical influence of the card, but it is really due to the impressions of the two objects being transmitted separately to the brain and there superimposed.

The Current Supplement.

The opening article of the current SUPPLEMENT, No. 1812, is entitled "Exploring the Dead Sea in a Motor Boat." In it Mr. Harold J. Shepstone outlines the mineral possibilities of the Dead Sea.—Mr. C. Hugh Sumner writes on the power of a locomotive boiler.—Forty years ago, 1,600 feet was regarded as a remarkable depth for a mine shaft, because of the difficulties in further downward progress. Chief among these difficulties was water. Thanks to modern machinery, it has been possible to go still lower. The whole subject is well handled by Dr. Niess in his article entitled "Practical Limit to the Depth of Mines."—Mr. John W. Titcomb's splendid article on "How Fish Are Hatched" passes to its fifth and concluding instalment.—Prof. E. L. Larkin summarizes the Mount Wilson solar conference.—A great deal of misunderstanding exists as to the meaning of the expression "ultra-microscopical particles," and as to what is meant by the term "beyond the limits of ultra-microscopical resolution." A clarifying article on the subject appears in the current SUPPLEMENT.—Mr. David S. Beyer concludes his instructive discussion of the mechanics of saving life. Many wonderful safety devices are shown.—R. Ewald writes on the constitution of the earth's interior.

The Shallowest Large Lake.

Of the great lakes of the world, Lake Chad is by far the shallowest, and it has vast tracts that fluctuate between the conditions of lake, swamp, and dry land, according to the relative values of the rainfall and the evaporation. The average depth of the lake is less than five feet. Its borders are exceedingly indefinite, for they vary not only with the total amount of water, but also with the direction and force of the wind.

The Chad has no outlet. It receives one-tenth of its water supply directly from precipitation; the remainder from the several rivers that empty into it. The loss of water is through infiltration and evaporation, and the latter process is most active during the periods in which the inflow from the tributaries is least; hence the great fluctuations in the depth and area of the lake that have led some travelers to suppose that it was drying up and destined soon to disappear. During the year 1908 the amount of evaporation was estimated at 1.86 meters (over 6 feet); it therefore exceeded the average depth of the lake!

Under these conditions the navigability of the lake, even for the smallest craft, is exceedingly precarious; so that instead of affording to the surrounding regions a means of intercommunication, the Chad is really a barrier between them.

Although all these facts have been gradually coming to light as a result of recent European colonization about the Chad, they are now for the first time fully brought out in the report of the Tilho mission of 1906-1909, the scientific results of which are being published on an elaborate scale by the French government.

Nicotine Process.

In a paper presented to the Academie des Sciences, M. Th. Schloesing gives an account of a series of experiments which he made in order to produce the greatest amount of nicotine from tobacco. The consumption of nicotine for destroying the parasites of plants and animals has greatly increased during the last few years, and the production of this alkaloid has thus become quite insufficient. At present this output is limited because commercial nicotine is only a by-product of the tobacco industry. In order to obtain nicotine under better conditions, if possible, the author examined the question so as to find out whether tobacco could be cultivated at a profit with a special view of obtaining the alkaloid from it. The French government, which controls all tobacco cultivation and manufacture, lent him its aid. The ground was planted in two different regions of France, in the proportions varying from 20,000 to 80,000 plants per acre. The general results showed that when we allow all the leaves upon the plant, without cutting, the amount of nicotine per acre is much lessened, so that we must find what is the best number of leaves to remain on the plant. For the tobacco of one region, this is from 6 to 12 leaves, using nitrate fertilizer at the rate of 1,200 pounds per acre. The best seems to be six leaves with more fertilizer, say 3,200 pounds. Other conditions may come in, such as the compactness of the planting, climate, and kind of fertilizer. Thick planting has less influence than the number of leaves on each plant in the amount of nicotine produced per acre. An excessive amount of fertilizer such as nitrate of soda is not to be recommended as it does not appear to increase the weight. In the most favorable cases he found 340 pounds of nicotine per acre with 40,000 plants of six leaves in one region, and in another this was 700 pounds per acre using 20,000 plants of six leaves. It thus appears that the experimental conditions do not differ enough from what usually prevails for us to hope for much increase in nicotine production by any improvements in tobacco cultivation. With the present price of tobacco and nicotine, it would be impossible to cultivate tobacco, in France at least, with this special end in view.

Prize for Scientific Essay.

The Association of Electrical Engineers, graduates from the Montefiore Electro-Technical Institute, has recently issued a prospectus of the conditions governing competition for a prize to be awarded during 1911.

This prize, consisting of the accumulated interest on 150,000 francs ($28,950), in Belgian 3 per cent bonds, is to be awarded to the author of the best original work presented on the scientific advancement, and on the progress of electricity in its technical applications. Articles may be written either in French or English, and printed or in typewritten manuscript.

The jury will be ten electrical engineers, five Belgians and five of other nationality, under the presidency of the director of the Montefiore Institute. Twelve copies of each contribution must be sent postpaid to M. le Secrétaire-Archiviste de la Fondation Georges Montefiore, Rue St. Gilles, 31, Liege, Belgium, before March 31st, 1911.—From Consul H. Albert Johnson, Liege, Belgium.

Robert Loraine, the actor-airman, on September 11th flew from Holyhead, Wales, across the Irish Sea to within 300 or 400 yards of Howth Head, Ireland, finally falling into the water and swimming ashore. The distance covered was fifty-two miles—a record flight over the sea. Loraine wore an inflated coat and a cork life jacket. His engine stopped several times, but fortunately started each time before the machine dropped very far. He could not rise so as to avoid the cliff at Howth Head and its eddies of air, and so he dropped into the sea. Loraine swam to a lighthouse. Half an hour afterward the biplane was picked up by a steamer.

THE INVENTOR'S DEPARTMENT

SIMPLE PATENT LAW; PATENT OFFICE NEWS; INVENTIONS NEW AND INTERESTING

The Editor will pay for short articles available for this department

THE FUNNY SIDE OF INVENTION.

The United States Patent Office has now granted nearly one million patents. A large percentage of these are undoubtedly valid under the law. Not nearly so many, however, are commercially valuable. Some few, which may or may not be valid in law, appear so impracticable that they may be termed "freaks."

In 1854 a patent was granted for a *tapeworm trap*, consisting of an oblong box, three-fourths of an inch long and one-fourth of an inch in diameter, and having rounded ends and an opening in its side. Inside the box is a spring-pressed part having a serrated edge. A bait, that is, food for the worm, is placed in the trap. A string is attached to the trap. After fasting long enough to make the worm hungry, the patient swallows the trap. The worm puts its head into the trap through the side opening and attacks the bait, movement of which releases the spring-pressed part of the box, so that the worm is thus caught. The patient then pulls the trap and the worm out of his "great within." The writer, however, has found no authenticated record of a successful removal by means of this trap. The trap is illustrated.

Claim 1 of a patent granted to a Mr. Converse reads as follows: "As an article of manufacture a dry, semi-cooked, pitted prune, substantially as described." If that is valid, housewives must not let the fire go out under the pot of stewing prunes, nor let a single prune, while in a semi-cooked condition, lose both its pit and juice; else they will be liable for damages for infringement of this patent.

The attention of housewives should also be called to a patent taken out by one Carr. No more can they make the "turn over," or little pie, our grandmothers used to make for us; for Mr. Carr has a claim for "forming dough into disks or blanks, impressing the same with transverse grooves, and then folding the impressed blanks along the lines of the grooves."

While it was in force, the farmers of the country who utilized any stray corncob as a currycomb or for other polishing purposes were patent infringers, for the reason that in 1891 Mr. A. T. Good received a patent for a polishing cone consisting of a corncob, as illustrated.

It took two men and a hen to reduce to practice an invention the object of which is to "provide a registering counter for recording the total number of eggs laid by a hen or other fowl, the device to be attached directly to the fowl and to be worn indefinitely." Claim 1 is as follows:

"In an indicating device, the combination of a register, said means adapted to be set in operation by an egg issuing from the fowl, operating means for said register, and means for attaching the device to the body of a fowl."

A man named Sparks has patented a device for preventing hens from setting, comprising a hood or blinder to keep the hen from seeing to the right or left or upward. The inventor states that a hen will never fly where it cannot first look. The device thus keeps the hen from flying into the nest for setting purposes. Shanahan has patented an electric egg-holding device "designed to break up or reduce to a minimum the practice of egg picking so prevalent among domestic fowls."

Among other patents of interest to farmers may be mentioned that of Mr. P. J. DeVires for teaching milking. His invention comprises a receptacle shaped like the udder and teats of a cow. The pendant teats are soft and compressible, so as to imitate the yielding nature of a natural teat.

It is feared that this ingenious invention may build up false hopes in the heart of the city maiden who aspires to become a proficient country milkmaid. When she first tackles the real thing, and the cow puts one foot in the milk pail and the other one in her lap and its tail in her face, the would-be milkmaid will, it is thought, be firmly convinced that the United States patent system is far inferior to that of Germany.

Joseph Karwowski seeks to outdo the ancient Egyptians, and proposes to preserve the dead by "first surrounding the corpse with a coating of sodium silicate (water glass) and then surrounding the same with an outer coating of molten glass." You can preserve the entire figure of your departed friend or enemy, or his head only. The full-length "preserve" could be utilized as a lawn statue, while the bodiless head could be placed on the mantle in the stead of a jar of ashes, or could be used as a heavy-weight paper weight or as a door stop.

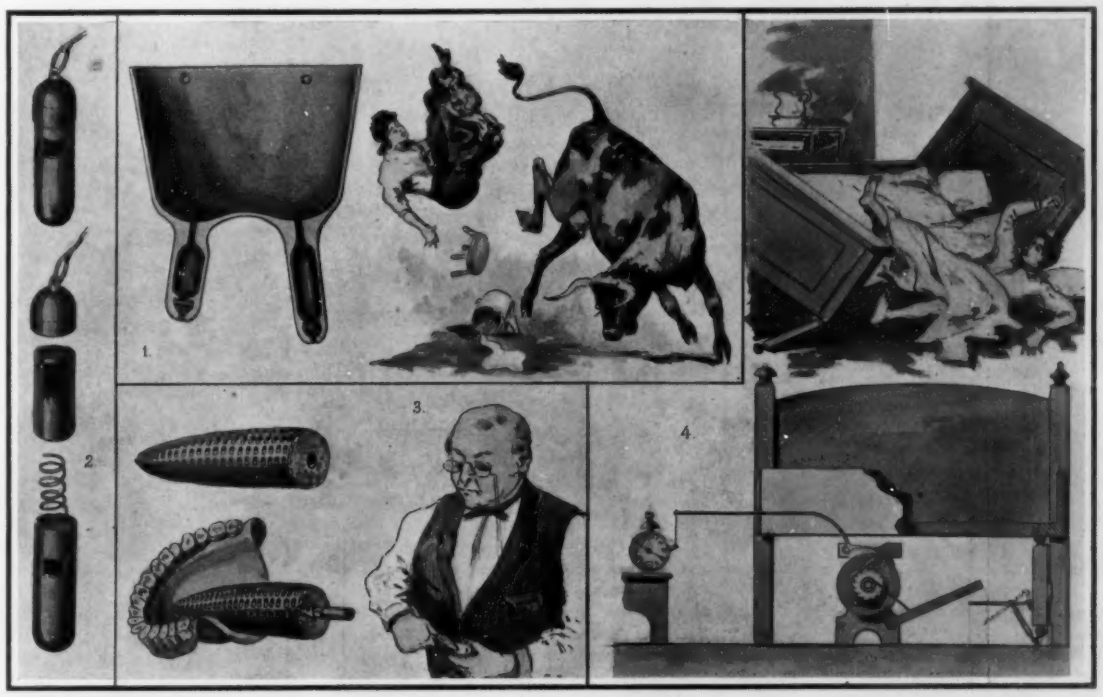
In 1891 George Washington Henry secured a patent for "Completed blackboards, made at a factory or other place, and set up where required."

In 1874 Mr. F. T. Newbery aspired to rival or forestall the pipe-line system of the Standard Oil Company by patenting an apparatus for supplying cities with milk. His scheme involves a pipe line from the place of milk supply to the city to be supplied. The pipe is kept full of water when not in use for transmitting milk. When it is desired to deliver milk, a signal is sent from the supply station to the receiving station, and then the milk is pumped into the pipe line against the water. When the system begins to run milk instead of water, it is collected at the city end. No means are provided for preventing the city collector from taking water at both ends of the milk supply.

George Hitz has patented a process of growing sweet potatoes which consists in: "First selecting a hard, unplowed soil; second, covering it with sand: and third, planting the tubers in the upper part or sand, whereby the roots of the tubers will penetrate the soil, and the tubers will form in the sand and a little above the subsoil." Why not patent the art of drinking and eating?

Mr. Thomas Toomey purposes to prevent the robbing of mail and express cars by having the platforms where the robbers must board the train provided with steam nozzles, whereby a jet of steam may be thrown into the face of the robber as he tries to get on the train.

Mr. George Q. Seaman has proved himself a benefactor of those hard sleepers who find it necessary to wake at a certain hour. Mr. Seaman, realizing that an alarm clock often fails of its purpose in waking people, or at least in compelling them to get up, has invented a bed which will overcome this difficulty by actually ejecting the occupant of the bed, so that the occupant will not only be awakened, but must necessarily arise. Mr. Seaman's device comprises a bed having a portion or all of the bottom hinged and supported by loose legs, and lever mechanism for retaining the legs erect in supporting the bed bottom and a clockwork mechanism adapted to release the lever mechanism and trip the legs, and thus dump the occupant of the bed on the floor at the appointed time. The drawing illustrates this marvelous device.



1. Device for instruction of would-be milkmaids. 2. Tapeworm trap. 3. Polisher for false teeth. 4. Effective alarm for sound sleepers.

THE FUNNY SIDE OF INVENTION.

Messrs. Lange and Jenke have invented and patented what they term a "burial shoe." This shoe is extensible lengthwise, so that it can be used for feet of different lengths. The shoe is cheaply made, but a "good-looker," and adapted to save the burial of a good five-dollar pair of shoes.

Mr. Lightwardt has invented a bootjack made in two parts, hinged together to close up into the outlines of a revolver. The advantages of this device are apparent. After removing his boots, the user may fold up his bootjack and put it under his pillow, and be prepared for burglars without any danger of hurting anyone.

Mr. Anderson, of Chicago, states that snoring is caused by breathing with the mouth open, thus "allowing a large and unbroken volume of air to enter the glottis." To overcome this pernicious habit, Mr. Anderson has invented a mouthpiece to be placed in the mouth and strapped into position. The column of air is broken up by passing through separate openings in the mouthpiece, and snoring is prevented. The utility of this device is not vouched for by the writer.

In 1860 Mr. Thomas Windell secured a claim for the manufacture of tombstones of glass, in which inscriptions may be pressed. Mr. Windell, evidently desiring to call attention to the patentability of this claim, shows the following inscription in his tombstone:

Here lies Windell,
An Inventor by trade,
This monument you see
Is an invention he made.
A curious fact,
It has sometimes been said,
That he made it while living,
But enjoys it while dead.

In 1877 William Tell Stieger invented a "pedal calorificator." His device comprises a pair of tubes long enough to reach from a person's mouth to his feet, each tube having a foot covering at one end, and both tubes connecting with a mouthpiece at the other end. A strap secures the device in position, so that the wearer may breathe into the mouthpiece, and the warmth of the breath is conveyed to the foot coverings. This inventor evidently possessed more than his share of hot air, for he states that he assumes the actual tem-

perature of his breath to be 88 deg. F., and that he finds that he can deliver that hot air into the shoe covers with a temperature of 84 deg. F. Inasmuch as we have never tested Mr. Stieger's foot-warming apparatus, we refrain from passing an opinion thereon.

Mr. D. Blanchard, living in the tornado district of Brooklyn, N. Y., has patented a tornado-proof house, pointed at both ends and mounted to rotate on a track, so as to keep one of its noses headed into the tornado.

Ladies desiring waists that can be easily armed will no doubt be interested in the patented device of Carl Holmgren for fastening corsets. This device consists of a long-handled lever mechanism competent to cinch a Texas broncho down to the size of a jack rabbit.

The real inventor and the patent attorney may be interested in the claims of the following patents and may wonder how such claims are obtained:

Mr. Going has a claim for: "Breaking a shell into fragments, and then removing material from the periphery of one of said fragments until the same is reduced to the proper size."

Mr. Lamson claims a process which consists in: "Mixing the material to stiff plasticity, and giving the plastic mass concrete form."

Mr. Dodge in 1895 secured the following claim: "The process herein described of removing material from a pile, said process consisting in first removing the material on a line to form a radial channel in the pile and second moving the material in an annular path commencing at the radial line, substantially as described."

In 1906 Mr. X. Erlinger was given the following claim: "The process which consists in confining carbon dioxid under pressure with marble, and mixing the resulting gas with a liquid." The puzzle is to find and classify the "resulting gas."

In 1895 Mr. Davidson patented a rubbing post for animals, so arranged that when an animal rubs a portion of its body against such post, a medicated fluid will be released from a reservoir and directed to the body of the animal, to relieve any irritation of the skin. Mr. Davidson was granted the following claim: "The combination with a support of a tank secured thereto and provided with valves, and means for operating the valves, said means being arranged for actuation by animals rubbing thereagainst and for conveying liquid from the valves to the body of such animals."

It is not clear just how Mr. Davidson got this claim in view of patent 159,161, January 26th, 1875, to Dillon, who states that *his* invention "relates to a novel device for applying a healing ointment to the backs of sheep which are afflicted with scab or other sores; and it consists in the use of a containing-vessel within which the ointment is placed, and it is retained by valves at the bottom. A series of pointed spikes project downward from the bottom of this box, which is placed at a convenient height, so that the animals can pass beneath it, and the operation of scratching their backs will open the valves, so as to allow a portion of the contained liquid to run out upon the back."

Mr. C. Herold, of Pittsburg, in 1872 was granted a claim as follows: "As a new article of manufacture, shoeblacking packed in animal guts, substantially as and for the purpose specified." The "package" presented the appearance of a sausage.

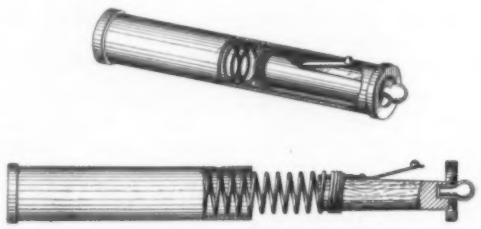
A farmer living near the line between France and Germany, whose fields, like the New England farms discovered by Mark Twain, could be tilled on both sides, is said to have invented a pair, or set, of stilts, to be worn by the off horse when plowing on a steep hillside, so as to bring such lower horse on the same pulling level as the other horse higher up on the hillside.

One way of stopping a fast-moving vehicle, whether it be a train of cars or an automobile, is to throw an obstacle in its path. The method is not always safe. Yet a similar principle underlies a patent for an emergency brake for vehicles which has been granted to Herman F. Dietz. His invention is claimed to be particularly adapted to automobiles. A drag chain or shoe is normally held clear of the ground by a detent, and is released when necessary by dropping the detent and allowing the chain or shoe to drop and trail under the wheel. The inventor states that the rotation of the wheel is stopped "almost instantaneously, by interposing between the wheel and the ground the roughened drag or shoe." The effect on a pneumatic tire can be imagined. It must be stated for the inventor that he intends to use his brake only in cases of emergency when the regular brakes have failed to operate, or the motor car is skidding on a slippery pavement.

Thomas A. Edison has invented what he calls a kinetophone, which is a combination of his kinetoscope and his phonograph. It is his object to produce pictures which talk. He recently gave an exhibition at his West Orange laboratories, which was very impressive. The Scientific American hopes to publish an article on the invention in the near future.

ODDITIES IN INVENTIONS.

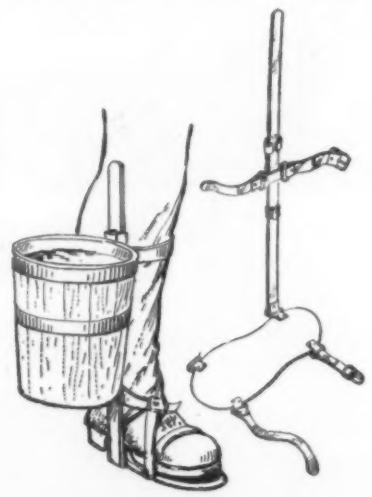
Trick Electric Pocket Lamp.—The accompanying illustration shows, in one view, what appears to be a harmless electric pocket lamp of standard type. However, the lamp is merely a glass bulb or knob, and it is supported on a wooden stem pressed by a coil spring. This spring is released by touching a button, causing



TRICK ELECTRIC POCKET LAMP.

the lamp to be projected outwardly, to the consternation of the person who presses the button with the expectation of turning on the light.

Milk Pail Holder.—In order to relieve a farm hand of the labor and strain of holding a milk pail clasped between the knees, a pail holding device has been invented consisting of an attachment that may be strapped to the leg and to which the pail may be secured as desired. The pail holder consists of a foot base, on which the shoe of the operator rests, and a vertical rod which extends upward to the operator's knee. The foot plate is strapped to the shoe and the



MILK PAIL HOLDER.

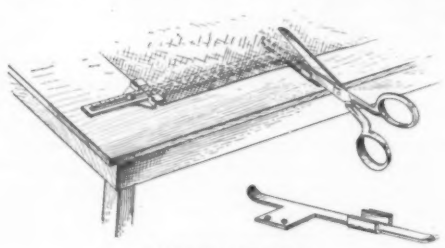
rod is strapped to the calf of the wearer. Mounted on a rod is an eye adapted to receive a hook carried by a central hoop on the milk pail. A clasp is arranged to slide on the rod and is provided with a projecting lug adapted to be moved into engagement with an eye formed on the upper hoop of the milk pail. By means of these two securing devices, the pail may readily be attached to, or disengaged from the rod.

Sanitary Drinking Fountain.—A fountain adapted for use in schools and other public places has been invented which is so arranged as to form a jet that will make the use of a cup unnecessary. As shown in the illustration, the invention consists of a series

SANITARY FOUNTAIN.

of tubes which may be bent to any ornamental design, and which at their upper end are trained to deliver the water to a common center. The impact of the water at this central point produces a geyser-like jet over which the drinker can apply his mouth, while the unused water falls to the base of the drinking fountain. Thus one is assured of having pure, fresh water that has not been contaminated by the lips of anyone else.

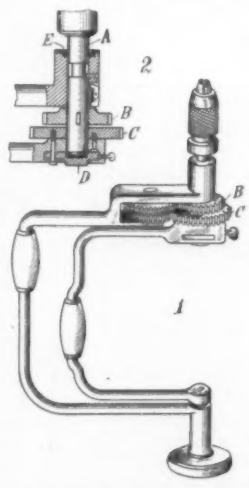
Gage Attachment for Shears.—In order to permit of cutting material into strips of uniform width, a simple gage attachment has been provided for shears.



GAGE FOR SHEARS.

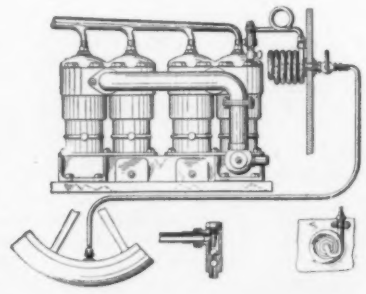
As shown in our illustration, the gage consists of a graduated bar, to which a head may be secured at any desired adjustment. At the opposite end of the bar is a clip in which one of the blades of the pair of shears may be fitted and secured by friction. With the head of the gage bearing along the edge of the fabric the shears will always be kept at a uniform distance from the edge and hence will cut a strip of uniform width.

An Improved Bit Brace.—The brace which is illustrated herewith is so arranged that it may easily be converted into a gear-driven breast drill. The chuck is supported on a shaft *A*, which is movable axially in its bearings. A feather on the shaft is adapted to connect it either with the gear wheel *B* or the gear *C*. Our sectional view shows the shaft engaging the gear wheel *B*. The thrust of the shaft is taken by a bearing plate *D*, which, however, may be swung aside when it is desired to connect the shaft with the gear *C*. The thrust is then taken by the bearing *E*. The brace is provided with two crank handles, the outer one of which is intended to be held stationary, while the inner one is revolved. The gear *C* is secured directly to the inner crank, and when it connects with the shaft *A*, the chuck is turned directly by operating the crank. When, however, the shaft *A* is connected to the gear *B*, power applied to the crank is conducted through the gear *C* to a pair of spur wheels mounted in the fixed crank, and thence to the wheel *B*, which drives the chuck. The illustration shows the gears arranged to produce a rapid rotation of the chuck, but by rearranging the gearing a slow and powerful rotation of the bit may be obtained.



A COMBINATION BIT BRACE AND GEARED BREAST DRILL.

Tire Inflater for Automobiles.—It has been proposed heretofore to inflate tires on an automobile with the burnt gases from the cylinders of the engine; but in order to provide a requisite pressure it is necessary that the engine shall be running under a load. It is, of course, impracticable to inflate the tires when the automobile is running and also impracticable to operate the engine under a brake when the clutch is open. An inventor has recently found a way out of the



TIRE INFLATER FOR AUTOMOBILES.

dilemma. He provides for utilizing the burnt gas from one of the cylinders of a multiple cylinder engine while the ignition in the remaining cylinders is cut off, so that these remaining cylinders offer the necessary resistance to create the load against which the active cylinder must operate in order that the burnt gases may have the necessary pressure.

Legal Notes.

A very interesting case was decided in the United States Court of Appeals for the Sixth Circuit, which involved a principle not altogether new in patent law, but still a principle of interest to lawyers and inventors alike. The suit was brought by the Alliance Machine Company to obtain relief against alleged infringement by the Morgan Engineering Company of patent No. 791,951, for certain improvements in cranes. The crane in question was a traveling crane carrying both a main hoisting pulley and an auxiliary hoisting pulley. The inventor stated in his patent that it was his object "so to construct the crane as to permit ready accessibility to the supplementary trolley, to reduce the strain upon the girders which constitute the side members of the crane bridge, to permit of the mounting at any desired point on the bridge, preferably at the longitudinal center of the same, of the motor which drives the bridge-traversing mechanism, to increase the range of movement of both of the trolleys, and to permit of a more compact arrangement of the hoisting mechanism on the main trolley than is possible with the ordinary construction of crane."

The usual denials, lack of novelty and patentability, were set up, as well as prior anticipations. In other words, the defendants claimed that the improvements over the prior art consisted in the relocation and rearrangement of the parts of the well-known double-trolley traveling crane, without attaining any new function or mode of operation.

The court held that the reorganization of a crane having main and supplementary trolleys, so that the hoisting chains from the main trolleys are placed inside, instead of outside the girders supporting the main trolleys, involved invention. The resulting machine was, to quote the language of the court, "a novel machine that could not be rightly classed with the overhanging ladle crane." The nearest approach to any specific form of the patented crane was disclosed in a blue print sent with a proposal to build a crane for the Illinois Steel Company. This proposal was not accepted, and no publication of either the proposal or the blue print was ever made. This unused prior drawing could not be construed as an anticipation within the meaning of the patent statute, according to the court.

Under the old copyright act a perforated music roll was not held to be a copy within the meaning of the law. Perhaps a legal decision which contributed largely to that interpretation of the old statute was handed down in a case in which Mr. John McTammany figured many years ago. He was the defendant in an action involving the alleged paper-roll infringement of a popular copyrighted song. Experts in perforating paper for automatic musical instruments were put upon the stand by the complainant, and read with ease some of the perforated music rolls which the defendant's attorneys submitted to them in the effort to prove that holes in a sheet of paper could not be identified as particular compositions. The case looked black for the defendant. Three days before its conclusion, after his own lawyers had practically given up hope, he decided that it was time for him to act. He determined to invent an entirely new instrument and an entirely new music roll that would baffle the complainant's experts. He decided to rearrange the scale. Instead of beginning with C he began with D, and thus mixed up the letters of the scale. He labored night and day to construct a crude instrument which would play the new roll. When the court convened again he produced his instrument and his rolls. The new perforated music proved totally unintelligible to the complainant's experts, who pronounced it no music at all. When it was passed through the instrument, however, in open court, it played the very song on which complainants claimed to own copyright. The case was carried eventually to the United States Supreme Court at Washington. But after that mechanical ruse, it was impossible to regard the perforated music roll, legally at least, as a copy of a musical composition. Under the new law, such perforated rolls are specifically protected.

The speed of an automobile moving faster than the wind may now be measured by a photo speed recorder, which has been described in the SCIENTIFIC AMERICAN. The violator of municipal speed ordinances may have his rate calculated to a mathematical certainty and used in evidence against him. The method is to take two pictures of a moving object from behind, one picture about a second later than the other. The object having moved through a certain distance during the interval, its image in the second photograph will be smaller than in the first, and by measuring the difference in the size of the two images the distance the object has traveled during such period may be determined by the photographic rule that the distance of any object from the lens of the camera is as many times greater than the distance of the photograph from the lens as the length of any line of the real object is greater than its length on the photograph. The admission in evidence of the results of experiments with one of these photographic speed recorders, the Massachusetts Supreme Judicial Court holds, in Commonwealth v. Buxton, 91 Northeastern Reporter, 128, was not error, as such results did not depend on the fluctuations of human agencies, but on the workings of natural laws, and it was desirable to have some machine whose action, being dependent on the uniform working of the laws of nature, would accurately record the speed of a moving object.

Patent News.

A fan and a sunshade, apparently, have very little in common, and yet Rudolf Greenfield has received a patent for a combination of the two. His device when expanded combines the functions of a fan and a sunshade, and when contracted occupies so little space that it can be conveniently carried.

Every suburbanite will admit that the rooms of a wooden country house have an oven-like temperature during a sunny day, and that this heat is retained for the greater part of the night. The roof, of course, is responsible for this heating. One obvious way of reducing the temperature is to cool the roof by means of water, and a patent has actually been granted to a Baltimore inventor for such a device. The water is pumped through a standpipe to the roof, and the drippings are led through the usual drain pipes, not, however, to be lost, as may be supposed, but to pass through a hose to a lawn sprinkler. The inventor claims that not only does he use his water twice, but that after having passed over the hot roof the water is supplied to the sprinkler at a somewhat higher temperature, with the result that his lawn will profit by it. The final touch is contained in the statement that if a hot-water heating plant is available in the house, the water can be drawn through it before passing to the roof, so as to reduce the temperature of the lower rooms.

An inventor who has recently taken out a patent on a sounding horn states that in practice a horn of a given size and shape will respond better to certain notes than to others. In a general way a small horn is better adapted for high notes and a big horn for low notes. Hence the same horn is not equally satisfactory for both. To overcome the objection to employing several horns of different sizes, Adolph G. Kaufman has invented a single horn which he claims will be found sufficient, whether the notes be high or low. He simply combines two or more horns of different capacities or qualities in such a manner that they will receive the sound from the same source. The larger horn, it is claimed, will give the proper volume to the low notes, while the smaller horn will insure the proper value to the high notes.

To prevent seasickness, many inventors have patented seats and beds which are supposed always to maintain their horizontal position, whatever may be the pitching or rolling of the vessel. The latest invention of this kind is a "self-leveling cot, bunk, couch, and the like, for use on shipboard," patented by an Englishwoman, Miss A. L. Wertheim. She suspends the couch from a central point by means of a universal joint. Her idea is that the berth will so swing that it will be kept more or less steady by gravity and the inertia of the load, all of which is not new. To counteract the unequal distribution of the person's weight, a weight is provided and arranged to slide along the bottom of the cot. Fearing that there will still be a tendency for the berth to swing, electrical solenoids are employed. To the core of each solenoid one end of a cord is attached, which, after passing over a pulley, is fastened at the other end to a corner of the suspended berth. Switches are actuated by the motion of the vessel, to energize any or all of the solenoids, as may be required. In very rough weather, the solenoids may even be left continuously energized by the current. In some cases, solenoids are to be used which are mounted upon the upper part of the top frame of the berth, and the core of each solenoid is connected by means of a universal joint with a rod or chain fastened to a ceiling plate. When the solenoids are thus arranged, two mercury or pendulum switches are used, each secured to the wall of the cabin in the same horizontal plane, but at right angles one to the other. As the ship rolls or pitches, so will the cores of the solenoids rise or fall; the switches being actuated, and the solenoids energized, to hold the cot practically in a horizontal position.

The peculiar flicker of the moving picture has given rise, it is said, to an entirely new disease of the eye among habitues of the ten-cent celluloid theater. To overcome this objectionable scintillation Mr. Thomas A. Edison has recently taken out a patent for an "anti-flicker device for viewing moving pictures." His invention consists of leaves or members provided with small eyeholes about the size of the pupil of the eye, which may be held in front of the eye and through which the moving pictures are viewed. Mr. Edison states that such a device reduces considerably the objectionable flicker defect, when the device is held a short distance in front of the eyes. He suggests that the great beneficial effect may result in some measure from the cutting down of the supply of light entering the eye when the shutter is open, thus reducing the baneful shock caused by the impact of light on the retina when the shutter is fully opened.

Hon. E. B. Moore, Commissioner of Patents, who for several months last past has been in Buenos Ayres in the capacity of expert attaché and adviser to the United States delegates to the Fourth International Conference of American States, is now on his way home, sailing at Valparaiso August 7th for New Orleans, which latter port he expects to reach September 27th. Assistant Commissioner Tennant is still in charge of the Patent Office, and will continue so until the return of the Commissioner or of Assistant Commissioner Billings.

A Brooklyn inventor, Nils E. Landin, has invented a novel automatic step for cars. The inventor has kept in mind the necessities which arise in operating subway cars which run close up to the platform, so that their floors are level with the platform, but their trucks and wheels are below the level of the platform. At at least one station in the New York subway, extra guards are required to call the attention of passengers to the space between the car and the platform, for the purpose of preventing accidents. Mr. Landin's invention provides a step which automatically falls on to the platform when the guard opens the sliding door of the car, and thus forms a bridge over the dangerous gap between the car and the station. The mere act of closing the door simultaneously draws up the step, so that the guard need not pay any special attention to it. Some platforms are level with the car floor, or somewhat lower, and for these a straight step or bridge must be used. Some platforms, however, are higher than the floor, so that a straight projection would render it inconvenient for the passengers to board the car. To adapt his invention to both conditions, the inventor has divided his step longitudinally and made the front part movable independently of the rear part. Hence, when the step descends, its front portion rests flatly on the platform, leaving the outer edge of the rear portion at the platform, level.

A certain dentist, who likes things to be a little better than the so-called best, states that in his profession three things are needed to-day. First, an improved connection between the dental hand piece and the flexible drive shaft. It must permit the free movement of the hand piece in all directions, and be of such construction that it cannot be broken by the sudden or acute movements of the hand piece. Second, something to take the place of wasted gum tissue, that will present as good appearance as the colored porcelain, which checks, is expensive, and is easily broken, and will be as durable as the mottled or pink rubber, which fails in appearance. A third improvement needed is a light for operating purposes which will deliver a clear white light instead of a colored one, such as red, which is the predominating color with the light now in use, and is frequently bewildering to the operator.

As caveats cannot now be filed, inventors of so-called perpetual motion who have heretofore secured by caveats an official record of their attempts, will now doubtless seek to file applications for patent. The attitude of the Patent Office toward perpetual motion is that it is a physical impossibility and the Patent Office holds that this position can be rebutted only by the exhibition of a working model. Therefore the Patent Office holds applications for patent for perpetual motion, complete in all other particulars, to be incomplete until a working model has been filed, and the model must be filed within one year from the filing of the papers or the application will become abandoned. This enables the return to the applicant of the first government fee of fifteen dollars, if the application is not completed within the time limited.

The ordinary brass round nut which is used for making connections on batteries, coils, commutators, and the like, easily becomes loose, particularly when subjected to violent vibration. In order to overcome this objection, a Western inventor has hit upon the idea of making use of the ordinary resiliency of a loop of metal. A strip of brass is bent upon itself four times so as to form a more or less square nut. The ends of the loop are held closed while they are being drilled and tapped. When released, the ends spring open slightly, thus throwing the threaded apertures in the double ends out of alignment, and taking up the slack between bolt and nut. Hence, the nut is constantly in a state of tension and cannot be loosened by vibration, even if it should happen to be midway on the thread of the bolt and not against any shoulder.

It is not generally known that the martyred President Abraham Lincoln was an inventor and patentee. On May 22nd, 1849, a patent was issued to him for a means of buoying vessels over shoals, the patent being numbered 6,469. He was at the time a resident of Springfield, Ill., but the oath accompanying the application was executed in Washington, D. C., on March 10th, 1849, and the petition bears the characteristic A. Lincoln signature.

RECENTLY PATENTED INVENTIONS.

Electrical Devices.

ELECTRIC SWITCH.—B. C. WEBSTER, Bridgeport, Conn. This invention comprehends a switch having a revoluble shaft which is turned step by step by the depression of a button by hand, and connected with the revoluble shaft are certain parts for bringing the contact members into and out of engagement with one another under conditions insuring reliability and certainty of action.

Of Interest to Farmers.

MECHANICAL MILKER.—L. L. STORY, East Fairfield, Vt. This mechanism milks cows separately and singly; compression is used instead of suction; the udder is mechanipulated so as to completely evacuate the same; means prevent injury or hurt to the cow; it carries on milking on different sides of the udder; the mechanism can be adjusted to the physical irregularity of different cows; and the devices extract milk by progressive downward compression of the teat in simulation of the human hand.

Of General Interest.

REBOILER.—C. G. CARLEY, Colorado, Texas. Mr. Carley's invention relates to devices for reboiling water which has been condensed, preparatory to making artificial ice. An object is to provide a device in which the water may be boiled by means of steam from the main boiler, for the purpose of driving out the air detrimental to the formation of ice.

SAFETY-LOCK FOR ELEVATORS.—W. R. WEST and G. C. BAKER, Leichhardt, New South Wales, Australia. The purpose here is to provide a device which will lock the elevator automatically so that lives cannot be jeopardized by the carelessness of an attendant—and secondly, by making the releasing of the grips dependent on the use of a detachable key, to prevent any unauthorized person from putting the elevator into motion during absence of the attendant.

GAS-SEPARATOR FOR OIL-WELLS.—L. W. BROWN, Bakersville, Cal. The improvement refers to appliances for the separation of gas from oil and sand contained in crude oil of the California type as it is delivered from the oil wells, and is particularly designed to be used in connection with the inventor's oil and sand separator forming the subject matter of an application for patent serial formerly filed by him. In a general way the invention consists of a drum to which the sludge or crude petroleum from the well is delivered.

WATCHCASE.—E. J. WITTNAUER, New York, N. Y. The case is more especially designed for accommodating exceedingly thin movements, and is arranged with an inner cap or a cover to render the case dustproof without increasing the thickness of the case. The case center of the watch is provided with a groove or a recess, into which fits snugly the edge of the cap, cover, or bezel.

SURVEYING APPARATUS.—M. W. TERYRICÁ, São Paulo, Brazil. An object in this case is to provide a new method of surveying, whereby various surveying operations may be performed by reference to two or more sight points vertically spaced at convenient distances and suspended from aerial apparatus in connection with suitable instruments capable of measuring horizontal and vertical angles.

Hardware and Tools.

DOUBLE-DOOR BOLT.—A. M. HOSS, St. Paul, Neb. This lock for double doors is operated by one of said doors. It is for use for a series of hingedly connected doors, adapted to be held in locked position by one of said doors. The locking bolt for one of the doors carries a striker of the common lock, which bolt will yield to opening pressure when the other one is removed.

PLANTER.—C. F. JAYNES, Seattle, Wash. When used for transplanting plants the planter is so placed that the plant extends longitudinally of the shell, after which the shell is forced into the earth a suitable depth, and shell and plant are lifted out by means of a handle. The plant and the shell are then transported to the hole into which the first is to be introduced, and the shell is inserted therein. Pressure is exerted on a grip of the handle to retain the plunger in fixed position and the shell is withdrawn, thus leaving the plant with the earth taken up therewith in the hole.

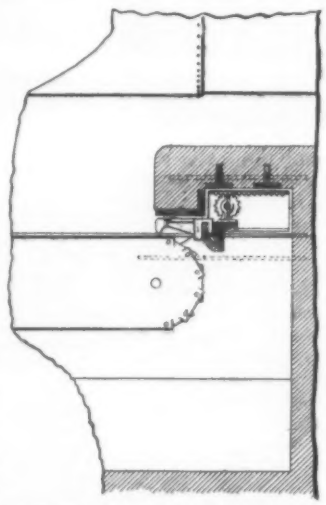
DOOR-SECURER.—C. H. JOHNSON, Petaluma, Cal. The purpose of this invention is to provide a door securer of novel construction, which is light, small, convenient in its application, will securely retain doors in closed condition, may be readily applied to doors whether flush with their casements or depressed therein, and that may be rapidly produced at a low cost.

SAFETY-RAZOR.—A. A. PRATT, New York, N. Y. The intention here is to provide a razor arranged to allow convenient insertion and removal of the razor blade, and to give the desired rigidity to the blade when in use. In order to obtain this object, use is made of a frame and a hinged carrier adapted to support the flexible thin razor blade and to clamp the ends thereof in position on the frame.

LOCK.—H. W. WOODRUFF, New Orleans, La. Mr. Woodruff's invention is an improvement in the class of locks wherein a slidable bolt or latch is operated by rotatable tumblers controlled by a numbered dial that is visible and accessible on the exterior of the safe to which the lock is applied.

Heating and Lighting.

FURNACE.—CHARLES A. CARLETON, Cumberland Mills, Maine. The furnace represented by the engraving is for use in connection with steam boilers and the like, in which the fuel bed formed by the mass of burning coal or other combustible is gradually moved into the furnace, by means of a mechanical stoker or in any other suitable manner, in which the movement of the fuel bed is limited, to prevent unconsumed fuel from falling into the



FURNACE WITH MECHANICAL STOKER.

ash pit, in which the movement of the ash pit is not hindered, in which the stop can be easily adjusted, and in which certain of the parts when worn out can be replaced without difficulty and without interfering with the operation of the furnace. An advantage consists in the fact that the space at the rear of the ash pit is cool on account of the draught, which allows the performance of work without any discomfort.

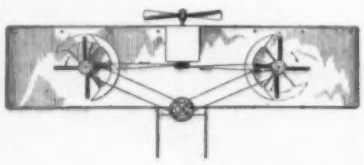
Household Utilities.

EXTENSION FOR WARMING-CLOSETS.—K. WATANABE, Seattle, Wash. This extension is arranged to permit of its conveniently folding into the warming closet or oven when not in use and to move the extension into active position to form an extension of the closet. Use is made of a pair of slides, slidable in the closet, and adapted to pass through the door opening of the closet, to rest on the door thereof, and a roller top mounted to slide on the slides and adapted to fold in the closet or oven.

GAS-RANGE ATTACHMENT.—M. P. O'DONOHOE and C. P. ELLIS, Nashville, Tenn. This invention has reference to devices to prevent a gas cock from being accidentally turned to a position in which it will allow the escape of the gas, the device being especialy constructed for gas ranges, and is an improvement in the range attachment disclosed in Letters Patent formerly granted to Mr. O'Donohoe.

Machines and Mechanical Devices.

PROPELLING AND STEERING DEVICE FOR AIRSHIPS.—EDWARD HOULT, New Westminster, British Columbia, Canada. The invention illustrated herewith relates to airships,



PROPELLING AND STEERING DEVICE FOR AIRSHIPS.

and the inventor's aim is to provide curved hoods pivoted concentrically with the propellers, there being means to regulate the position of the hoods relatively to the airship, so that the movement of the air at one side of the propellers will be confined. By moving the hoods around their axes, the direction of movement of the airship may be controlled and the airship may be driven forward, backward, to the right or to the left, as desired. By the use of the device, a lifting, pushing, steering, and gyroscopic action is obtained. The invention may also be used on dirigible balloons, with the axes of propellers and hoods horizontally disposed.

GATE.—G. M. WEST, Lamont, Ark. This invention relates to gate operating devices. The device opens or closes a gate by the operation of the aproaching or departing vehicle. It provides a novel form of latch for holding the gate and novel mechanism for releasing it. It also provides an actuating spring of simple construction but which serves to keep the gate in its normally closed position.

WIND-MOTOR.—W. A. WILLIAMS, Olivet, S. D. This improvement relates to motors for developing power through the agency of winds and air currents, and relates more particularly to a device of this class comprising a casing constituting a wind conduit and having a wind concentrating and directing inlet, and wind-operable power-producing mechanism in the casing.

DIGGER.—J. K. SMITH and E. M. SMITH, Spencer, Ind. The object of the invention is to provide a digger for various agricultural and other purposes, which can be adjusted so that drains or ditches of different dimensions can be formed thereby, which can be used for harvesting potatoes, beets, and other tuberous plants, and which can be employed in filling ditches or other openings in the ground.

CENTRIFUGAL SEPARATOR.—F. R. ABEEL, Tacoma, Wash. This invention relates to the separation and saving of gold from sand or other refuse material, and has for its object to provide details of construction for a gold separator, which operates by centrifugal force, and that will separate fine gold from sand, or other debris that is passed through the machine.

Railways and Their Accessories.

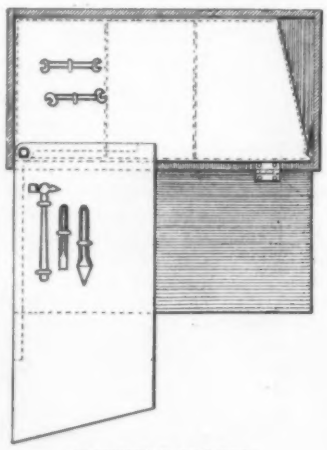
CAR-FENDER.—O. M. SNYDER, Hagerstown, Md. An object of the invention is to provide a sliding extension which can be projected forwardly by a system of levers, which operate so that the force is applied at the opposite sides of the movable member with the same intensity, thereby eliminating the danger of the sliding member becoming jammed in its guides, as would occur if the force were applied only at the center.

AUTOMATIC CAR-FENDER.—A. J. HAGAN, Represa, Cal. In this instance the invention pertains to an automatic fender for cars or the like, and an object of the invention is to provide a fender which will automatically drop to scoop up a body by the impact of the body on a trip gate. The invention provides an automatic drop fender with means for readily returning the fender to its normal position.

DOOR FOR GRAIN-CARS.—W. G. CRAIG, Marshalltown, and A. R. RAMSDELL, Toledo, Iowa. An object of the inventor is to provide a hinged post, and two doors pivoted on horizontal axes, which are adapted to engage a slot in the hinged post and be secured thereto. Another object is to provide means by which the doors are held in position relatively to the side of the car, to prevent grain from working through the doorway.

Pertaining to Vehicles.

AUTOMOBILE TOOL-BOX.—FREDERICK HENGEL and JACOB ADDIS, 770 Fairmount Place, Bronx, New York, N. Y. The invention as shown is an improvement in tool boxes for motor vehicles, and embodies a box in which the tools are accessibly contained, as by arranging them on shelves and in one or more drawers hinged on a fixed vertical rod or axis adjacent to an outer corner of the box, the



AUTOMOBILE TOOL-BOX.

outer side of the box being hinged at the bottom, affording a door which, when opened, permits of the shelves and drawer swinging on the axis in a horizontal plane, to the outside of the box. In this tool box the substantial character of the construction insures the shelves and drawers being positively held against rattling and will be automatically released and engaged when drawn from and swung into the box.

WHIFFLETREE.—D. HURD, Niagara Falls, N. Y. The invention provides a whiffletree, to which the ends of traces or tugs used in harnessing draft animals can be attached, which can be manipulated with ease and rapidity to attach and detach the traces, and which is so constructed that the ends of the whiffletree do not project beyond the ends of the traces, and thus cannot cause injury to plants or the like.

NOTE.—Copies of any of these patents will be furnished by Munn & Co. for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.

Notes and Queries.

Kindly write queries on separate sheets when writing about other matters, such as patents, subscriptions, books, etc. This will facilitate answering your questions. Be sure and give full name and address on every sheet.

Full hints to correspondents were printed at the head of this column in the issue of June 18th, 1910, or will be sent by mail on request.

(12290) **A. S. asks:** Will you kindly inform me through the SCIENTIFIC AMERICAN where I can obtain a book showing the formula for figuring resistance when desiring to reduce currents through a rheostat? A. You will find a valuable article upon the winding of rheostats in our SUPPLEMENT No. 985, price 10 cents. A rheostat is the application of the law of drop of potential along a conductor; the drop of potential betweeen two points is proportional to the resistance between those points. In the ordinary use of a rheostat it is desired to have a certain current flow without overheating the apparatus. The apparatus and the rheostat are in series and the same current flows through both. The total resistance is that of apparatus and rheostat. Ohm's law gives the resistance by dividing the voltage of the circuit by the amperes, which are required for the service to be rendered. The resistance of the apparatus, subtracted from the total resistance, leaves the resistance required in the rheostat. For example, an arc lamp in a stereopticon may require 15 amperes, and will require about 50 volts. If the current has 115 volts, the remaining 65 volts of the total drop of potential must be taken up by the rheostat; and 65 divided by 15 gives 4 1/3 ohms as the required resistance. If the coils are arranged so that the current goes back and forth through them, the rheostat may be used either upon a direct or alternating current. The size of wire is determined by the carrying capacity allowed by the fire underwriters, who control the use of electricity in buildings.

(12291) **C. V. S. says:** Will you please state in your next issue whether the top of a wagon wheel runs faster than the bottom, on wagon traveling over the road. A. The motion of a wagon wheel as referred to different points is quite complicated. It is evident that the whole wagon wheel moves forward over the road as fast as the wagon. If any part went slower than the wagon, it would surely be left behind, as anyone can see; so that judged by a person in the wagon, the top of the wheel goes along as fast as the rest of the wheel. Wagon and wheel travel over the road together. Again, the part of the wheel which is in contact with the ground, that is, the bottom of the wheel, is at rest on the ground, unless the wheel is slipping, which of course is not supposed in the question. An eye on the level of the ground watching the wheel as it approached would see a point on the rim come down toward it and stop for an instant and then rise again. Again, with reference to the side of the wagon, the rim of the wheel goes down, backward, up, and forward in succession. At one moment a point on the rim is in front of the hub, and after a half turn it is as far behind the hub. It is also above and below the hub at each half turn. A point on the rim falls, rises, goes forward, and backward with reference to the ground twice as fast as the hub is moving. And again, the whole wheel rotates with a circular motion around the center of the axle. All these curious features of the motion of a wagon wheel have been many times pointed out in the Query column, and have been fully discussed there; and we should say it is simply a matter of the point to which the motion of the wheel is referred.

(12292) **R. G. W. says:** I wish to lift a certain amount of water 100 feet to a point one mile distant. Now, which will use the least amount of compressed air—to fill a tank with water and apply the air direct or use a direct pump? Also please tell me the pressure necessary in each case. A. To raise water to 100 feet and deliver it to a point one mile distant, you can use compressed air direct in a closed tank, if you are satisfied to have the water discharged in quantities equal to the volume of the tank, at intervals. If you must have a constant flow, you will be obliged to use the air in a direct-acting pump. The pressure might be the same in either case. Steam pumps, which are also suitable for compressed air use, are so made that the power cylinder is larger than the water cylinder, in the proper ratio to deliver the water when propelled by steam or air at the same pressure; this service is performed in feeding any steam boiler. In fact, by using a high-pressure pump, you could get along with a low air pressure, but with a direct tank you would need an air pressure equal to 100 feet head of water plus the friction in the pipe line, and this would probably be not less than 75 pounds air pressure in all, unless your one mile length of pipe is unusually liberal in diameter.

Legal Notices

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TESTING WEIGHTS AND MEASURES IN NEW YORK CITY.

(*Continued from page 233.*)

this particular case being the one-quarter of a pound specified in the ordinance as the limit of tolerance for such a scale, is sufficient to cause its condemnation. The test weight used and the others on the table are of the hanger pattern, which can also be carried about by the inspectors and used in testing the steelyards employed in weighing ice. The office standards or smaller weights which are carefully adjusted, and the portable equal arm balance used for testing shop keepers' weights, are shown also on the table. This nickel-plated balance is delicately poised, but can be taken about by the inspector and set up on any counter where the weights from the scales are to be tested. The individual weights must agree with the standards within a quarter of an ounce, and the weight here shown under test is too heavy by more than that amount. Several hundred of such weights on the day of the writer's visit had been condemned for such excess and failed to be sealed. Such a step obviously protects the small tradesman who otherwise might have used weights too heavy to his own injury.

"Condemned" tags were being attached to many spring balances, some of which exhibited such surprising faults of design and construction that they were incapable of accuracy. Thus, the small spring balance shown in the inspector's hand, is but a few inches in length, yet the scale indicates readings up to 75 pounds. Such a spring balance may have a few legitimate uses for rapid and approximate weighings, as of sash weights, but in reality it is purchased and used very largely by fish and other peddlers whose sales are usually of but a few pounds. Consequently, even if the balance is correct, it is impossible to read the fractions of a pound, and the customer does not get the exact weight to which he is entitled. A practical test of the importance of such work was witnessed when a junk peddler was found in the street in front of the testing station with a battered spring balance, so bent as to prevent exact weighing. A 50-pound standard hung on the balance indicated on the scale but 23 pounds, suggesting the profit to the peddler when he bought rags or old metal and paid for the same by the weight shown on his balance. This balance was duly confiscated in the presence of the author, and the dishonest dealer was handed over to the police, as hundreds are in the regular work of the inspectors.

Another defective new spring balance, shown in the illustration, is the one suspended from the chain, on the hook of which a 50-pound weight is hung. While the scale of this balance is marked up to 50 pounds, no reading beyond 47 pounds actually can be made, as the pointer is stopped when that point is reached. On the other hand, the large spring balance for weighing ice, shown on the left-hand corner of the table, has indications on a sufficiently clear and extended scale, and when loaded with the 50-pound test weights the readings were quite correct over the entire run.

On the right-hand corner of the table is a so-called household scale, that when employed for selling lends itself readily to fraud. It is faulty in its principle and deficient in accuracy even under normal conditions. The type is soon to be prohibited in New York, as even when used in the home its employment may be attended with indirect but most serious results. For example, the housekeeper receiving meat from the butcher and apprehensive of short weight, may use such scales to check the quantity. If a difference in the butcher's favor is indicated he is apt to be suspected of unfair dealing and the trade of the particular customer may be lost on account of the unreasonable confidence placed in an inaccurate spring balance costing but a mere trifle.

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Electrical separation, H. A. Wentworth.... 970,001
Electrical sliding contacts, coaling device for, B. von Ugrimoff 970,407
Electricity, apparatus for use in exercising, and developing and applying static, M. M. Hitt 970,332
Electrolytic apparatus, W. Thum 969,921
Electromagnetic device, W. S. Burnett..... 970,180
Elevator. See Oil and water elevator.
Elevator safety actuating device, W. C. Strang 969,811
Engine cranker mechanism, W. W. Owen.... 970,281
Engine plant for submarine craft, combustion, P. Winand 970,153
Engine starting device, internal combustion, F. H. Walker 969,815
Engine starting lever, explosive, R. McKee 969,798
Engines, controlling combustion, P. Winand 970,154
Engines, operating combustion, P. Winand.. 970,152
Envelop, F. R. Robertson 969,882
Equalizer, four-horse, C. F. Wille..... 969,928
Evaporation, method of and apparatus for, N. H. Hiller 970,054
Exhibiting and advertising apparatus, C. A. Gee 969,780
Explosive engine, Frayer & Miller 970,034
Extensible table, S. Mautner 970,071
Extracting apparatus, C. H. P. Lembke..... 970,246
Eyeglass mounting, L. F. Adt 970,160
Eyeglasses, J. C. Wells 969,819
Fair leader, A. Isaac 969,873
Fare box, Buckman & Kohler 970,178
Fastener for closures, T. F. Foley..... 969,776
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Feed bag, C. A. Boyd 970,290
Fence stretcher, P. A. Reki 969,880
Fibers from the pulp and extraneous matter of plants and trees, machine for separating, E. Behrendt 970,166
Filling buckets, etc., from hoppers, means for, A. Smith 969,988
Firearm, M. C. Lisle 970,248
Fish trap, floating, N. L. Moen..... 969,970
Fishing rod and reel, combined, O. M. Scott. 970,356
Flashlight apparatus, D. C. Shoberg..... 970,358
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Furnace cooling apparatus, blast, J. Kennedy 970,376
Furnace door, G. O'Neill..... 970,347
Furnaces, automatic fuel feed mechanism for, G. Dinkel.....970,191 970,432
Furniture, combination, F. Rogers..... 970,395
Furniture, elastic support for upholstered, G. Las 969,963
Fuse, protected or armor clad electric switch, Berry & Markham..... 970,296
Gage. See Spoon gage.
Galvanizing metal tubes, rods, etc., apparatus for, F. Werth..... 970,140
Game, A. M. Pope..... 969,804
Game, McDonald & Bennie..... 970,297
Game, T. F. Gallagher..... 970,321
Game apparatus, G. W. Matthews..... 970,070
Game apparatus, baseball, T. E. Murray.... 970,090
Game apparatus, planchette, D. Blaikley.... 969 935
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Garment supporter, J. W. Schloss	970,120, 970,121
Garment worker's table, S. G. Buskard	970,014
Gas burner, W. H. Hurley	970,056
Gas burner, F. Mummelthey	970,382
Gas burner, inverted incandescent, K. A. A. Staahlgren	970,275
Gas cleaning method and apparatus, Brassert & Witting	969,709
Gas cut-off, automatic, L. & H. Schmidt	970,122
Gas generator, acetylene, D. O'Keefe	970,100
Gas producer, W. B. Chapman	970,017
Gases, separating dust from, H. Howard	970,053
Gases, treating burner, J. B. F. Herreshoff	969,908
Gate, L. A. Wheeling	969,925
Gate, N. J. McAdams	970,090
Gate fastener, H. S. & J. K. Munsinger	970,345
Gear, friction draw, F. M. Snyder	970,131
Gearing, W. O. Hancock	970,328
Gearing, friction transmission, A. A. De Loach	970,190
Gearing, variable feed, A. H. C. Meyer	969,895
Glass beveling machine, E. Homan	970,227
Glass grinding and polishing apparatus, A. W. Hornig	969,871
Glass, means for drawing sheet, I. W. Colburn	970,182
Grader, L. N. Morscher	969,971
Grain binder knotter, W. Utt, Jr.	970,359
Grasshopper catcher, M. V. Whiting	970,004
Grinding barrel, D. C. Demarest	970,020
Grinding device, Pike & Hayne	970,351
Grinding machine, awl, W. B. Morse	969,896
Guard, D. D. Ogilvie	970,099
Hair dressing comb, C. H. Royalty	970,396
Hammock, knockdown couch, I. E. Palmer	970,388
Hammocks, canopy attachment for, C. S. Huffman	969,956
Handkerchiefs and like articles, machine for folding, R. Cunningham	970,424
Handle. See Tool throttle handle.	
Handle-making machine, M. Kamenstein	970,059
Harness attachment, E. Cowan	970,310
Harness, draft, T. W. Schlater	970,119
Harpooning device, S. Coleman	970,018
Harvester, corn, D. B. Raworth	970,266
Harvester cutter, B. F. Weathern	969,817
Hat planking machine, felt, A. Turner	969,999
Hatch fastener for vessels, M. Mulholland	970,447
Hay fork attachment, T. S. Barbour	970,415
Heat control, automatic electric, H. G. Geissinger	969,781
Heater, C. H. Hysong	970,450
Heating apparatus, hot air, C. St. John	970,117
Heel plate and frame, A. H. Devin	970,313
Heel spring, Taylor & Thomas	970,276
Hinge, W. T. Wightman	969,926
Hog holding machine, G. W. Cox	970,187
Hoisting device, brake, A. Bolzani	969,834
Horn, E. Teste	970,136
Horse releaser, T. Noble	970,346
Horseshoe, A. & J. Schwartz	970,267
Hose and pipe mender, F. J. Stulp	969,919
Hose rack, self-releasing, S. L. Crossing	970,188
Hose support, J. E. Austin	970,164
Humidifier, J. W. Fries	969,854
Hydrant cap, W. S. Reed	969,905
Hydraulic power plant, J. T. Dougine	970,196
Hydraulic power system, T. A. Macdonald	969,967
Hydroextractor, C. Miller	970,253
Ice cream freezer, C. K. Greaves	970,369
Incubator, M. Curtis	970,311
Incubator heater, M. M. Johnson	970,057
Indicator, C. Emsheimer	970,200
Ink, W. G. Fuerth	970,439
Inking mechanism, J. S. Duncan	970,027
Insect catcher, F. M. Carter	970,181
Insecticide and disinfectant, J. C. Dooley	970,434
Insulator, J. A. Muerling	970,078
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Internal combustion engine, L. A. Martha	970,251
Ironing cabinet, C. D. Booton	970,174
Ironing table, G. Foster	970,207
Irrigation system, M. P. McCulloch	970,383
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Journal and bearing, A. J. Fisher	970,030
Journal box, L. G. Woods	969,933
Journal box, S. J. Strid	970,133
Journal box, lubricating, G. P. Simmons	970,271
Journal lubricator, E. B. Brown	969,838
Junction box, M. Laux	970,377
Keyboard, musician's exercising, A. K. Virgil	970,144
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Knit drawers, lady's, M. Saldin	969,808
Knitting machine, Vermilyea & Hammersley	970,282
Knob and bell, combined door, R. Hazelrigg	970,222
Kraut cutter, J. S. Randolph	969,979
Labels or wrappers to blocks, packages, or tins, or other containers of material, apparatus for applying, W. & H. Rose	970,332
Ladder attachment, E. J. Curran	970,425
Lamp burner, O. M. Muller	970,084
Lamp chimney, composite, G. D. Willits	969,932
Lamp, incandescent gas, J. Rubin	969,984
Lamp, miner's, P. Toglesou	969,812
Lamp, projecting, G. A. H. Kellner	969,785
Lamps, pull socket for electric incandescent, J. L. Moore	970,255
Lantern holder, N. D. Bjorklund	970,171
Latch, F. C. Altmann	970,007
Lathe tool post, H. Haidy	970,219
Laundry iron, E. R. Smith	969,991
Leather and product thereof, coloring, M. M. Gregg	970,326
Leather skiving machine, J. R. Scott	969,987
Leather working tool, C. F. Punsky	969,806
Level attachment, plumb, W. A. Goble	969,855
Lifting jack, I. Key	970,239
Lighter, automatic, S. R. Battey	970,294
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Lint packing apparatus, G. W. Cameron	969,841
Liquid actuating apparatus, R. Conrader	969,940
Liquid fuel burner, B. R. Phillips	969,978
Liquid fuel burner, J. P. Hollenbeck	970,335
Lock, A. F. Schroeder	970,123
Lock, G. N. Mason	970,252
Lock mortiser, L. M. New	969,897
Locomotive, O. G. Pendleton	970,389
Locomotive frame, G. C. Abbe	970,287
Log impregnating apparatus, S. Willner	970,409
Log marker, O. Bureau	970,012
Loom shuttle, Snow & Stubbings	969,912
Magnet, alternating current, A. Simon	969,809
Mail box, O. J. W. Gleason	969,948
Mail box holder, E. T. Lillie	969,965
Mail pouch catcher and deliverer, E. J. Lahan	969,964
Mail wagon, G. A. Flinn	970,437
Manure loader and like device, J. J. Novak	970,259
Match receptacle, Steulik & Barilla	969,916
Mattress, O. M. Burton	969,840
Measuring skirt, A. M. Allen	970,006
Mechanical movement, J. H. Auble	970,163
Memorandum rack, R. D. A. Parrott	970,103
Menu card holder, W. H. Sawyer	970,399
Metal working machine, H. Hess	970,330
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Mine prop, J. H. Eickershoff	969,851
Miter box, J. J. Gregory	970,327
Mold, G. C. Dager	970,426
Molding machine, W. H. Hofmann	970,334
Mop head and wringer, combined, Douglass & Willett	970,197
Motion transmitting device, D. E. Selders	969,910
Motor starter, C. T. Henderson	969,860
Motors, method of and means for controlling regenerative electric, R. Lundell	969,894
Mower, motor lawn, H. S. Mustin	969,797
Mowing machine, J. P. Crosthwait	970,019
Music leaf turner, E. Schelbner	970,400
Music roll actuator, swinging, N. D. Hosley	969,783
Nail, J. A. Cunningham	970,423
Nail clipper, H. Leineweber	970,087
Nut and bolt lock, G. R. Knobeloch	969,786
Nut lock, M. Omalia	970,101
Nut lock, O. H. P. G. Spencer	970,274
Oil and gas burner, C. Donaldson	970,028
Oil and water elevator, T. H. McDonald	970,093
Oil burner, M. J. & W. L. Wright	970,156
Oil burner, W. H. Bradley	970,300
Oil burner, crude, L. J. Owlin	970,349
Oil or gas burner, A. W. Andorfer	970,363
Oiler, hand street, J. Archdeacon	970,290
Oiling device for stocks and dies, G. T. E. Henriksen	969,867
Optical purposes, color screen for, C. Ramstein-Gschwind	970,111
Orchard heater, J. L. Hamilton	970,044
Ore roaster, A. R. Wilfley	969,927
Ores, treating, E. B. Goodwin	970,325
Outlet box, C. T. Pratt	969,805
Package protector, A. Griesbeck	969,950

Churn, W. C. Kinser 970,061
Churn, W. C. Irvine 970,230
Chute, stock, F. S. Mills 970,344
Cigar bunches, making, J. E. Smith 969,902
Cigars, cigarettes, etc., case for, R. A. Nock 970,258
Cigarette machine, M. Pollak 970,110
Cigarette machine, portable, G. H. Carter.. 970,016
Cigarette tipping machine, A. Boucher..... 970,011
Circuit breaker, H. L. Van Valkenburg..... 969,813
Circuit conductors, binding device for, T. E. Murray 970,087
Circuit switch, L. Wilsch 970,410
Cistern cleaner, automatic, L. Thiem 969,997
Clamp, G. E. Browne 969,771
Cleaning tool, I. H. Spencer 969,913
Clock, E. E. Dungan 970,198
Clock synchronizing system, H. C. Korfhage 970,241
Clockwork globe, de Goumovitch & Comaillet 970,040
Closure and locking means, combined, W. H. Klemm 969,881
Cloth sponging and refinishing machine, G. Haft 969,864
Clothes drier, centrifugal, F. A. Binsmore. 970,022
Clothes wringer, E. Firth 970,317
Coal gas apparatus, vertical retort, J. H. Tanssig 969,996
Coal hod, J. L. Hair 970,218
Cock, gage, J. R. Brown 969,770
Cock, stop, J. E. Van Nostran 970,281
Coin controlled apparatus, J. M. Spendler.. 969,914
Coin controlled slide, R. P. Hammond..... 970,045
Coin holder, L. Nelson 970,097
Collar and cuff fastener, detachable, M. J. Dahill, Jr. 969,846
Collar, horse, E. Brown 969,837
Collet, A. R. Simmerly 970,129
Commutator bar and lead, C. E. Lord..... 969,892
Commutator construction, F. Jeffrey..... 970,233
Compounds of the active substance of suprarenal glands, and said compounds, making, M. Reuter 970,112
Concentrating table, A. R. Wilfley 970,283
Concrete mixing machine, L. W. Cargill.. 970,419
Concrete railway tie, reinforced, H. D. & W. B. Emmons 970,316
Concrete shingle molding machine, F. Latulip 970,242
Cooker, steam, O. E. Allen 970,289
Cooking appliance, S. T. Willson 970,286
Cotton gin and cleaner, combined, W. B. Turman 969,924
Coupling. See Car coupling.
Crate, folding, W. E. Thrasher 970,279
Crate, folding shipping, F. J. Youngren.... 970,362
Cross arm support and brace, combined, J. W. McCune 970,091
Cultivator shovel, R. P. Lentz 970,247
Curling iron, H. M. Slaker 970,272
Current motor, C. T. J. Miner 969,794
Curtain guide, J. E. Smith 970,130
Curtain, storm, I. L. Taylor 970,135
Cuspidor, H. E. Weber 970,148
Cycle saddle, motor, F. F. Meslinger 969,791
Damper regulator, J. A. Collins..... 969,939
Decoy, floating, H. G. Wethall 970,003
Dental appliance, W. D. Tracy 969,922
Designs on glass or other materials, producing, C. Monot 970,080
Die press, automatic, C. D. McDonald..... 970,082
Distilling coal, Aylsworth & Dyer 970,364
Ditch gate, A. J. Collar 970,308
Doff governor, slubber, intermediate, and fine frame, G. R. Kindrick 970,060
Door and the like checking device, K. Kramp 969,882
Door check, W. K. Henry 970,445
Door check and buffer, J. C. Sibiski 970,270
Door fastener, J. Sorrow 970,273
Door, flush closing, F. R. Hosser 970,337
Door hanger, barn, J. M. Whipps..... 970,408
Door switch, J. G. Peterson 970,264
Drag, J. E. Wright 970,155
Drill, C. Seals 970,401
Drills, hoe attachment for, T. J. Beezer.... 970,298
Drinking fountain, sanitary, J. Goebel..... 970,213
Dye, anthracene vat, F. Thomaschewski, et al. 970,278
Egg marking device, S. A. Merkley..... 970,074
Egg packing device, R. C. Holmes..... 969,954
Egg stamp, D. Ortiz 969,898
Egg tester, W. Rogers 970,115
Electric cut-out, T. E. Murray 970,088
Electric heater, portable, F. L. Dyer 969,849
Electric machine brush, dynamo, E. T. Mug 969,796
Electric machine, dynamo, E. Mattman.... 969,790
Electric motor, Arnold & La Cour..... 970,412
Electric switch, G. S. Williamson..... 969,824
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The testing outlined above must be done in a careful and legal manner, and to obtain successful prosecutions it must be shown that the standards of the station are correct. This is done by having them certified at the State Capitol as agreeing with the State standards which have been duly legalized. But few defendants have the temerity to call into question either methods or standards. A condition of affairs has now been reached where manufacturers of scales and measuring devices cannot risk the sale of inferior or inaccurate weights and measures in New York. That city previously has been the dumping ground of the worst and cheapest appliances, which found willing purchasers in the ignorant and unscrupulous. Now, with the compulsory sealing of weights and measures, such stock must find new outlets, as it will, where inadequate inspection methods prevail, for, unfortunately, there is no national law or regulations to deal

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Garment supporter, J. W. Schloss...970,120,	970,121
Garment worker's table, S. G. Buskard	970,014
Gas burner, W. H. Hurley	970,056
Gas burner, F. Mummelthey	970,382
Gas burner, inverted incandescent, K. A. A. Staahlgren	970,275
Gas cleaning method and apparatus, Brassert & Witting	969,709
Gas cut-off, automatic, L. & H. Schmidt	970,122
Gas generator, acetylene, D. O'Keefe	970,100
Gas producer, W. B. Chapman	970,017
Gases, separating dust from, H. Howard	970,053
Gases, treating burner, J. B. F. Herreshoff	969,868
Gate, L. A. Wheeling	969,925
Gate, N. J. McAdams	970,090
Gate fastener, H. S. & J. K. Munsinger	970,345
Gear, friction draw, F. M. Snyder	970,131
Gearing, W. O. Hancock	970,328
Gearing, friction transmission, A. A. De Loach	970,190
Gearing, variable feed, A. H. C. Meyer	969,895
Glass beveling machine, E. Homan	970,227
Glass grinding and polishing apparatus, A. W. Hornig	969,871
Glass, means for drawing sheet, I. W. Colburn	970,182
Grader, L. N. Morscher	969,971
Grain binder knotter, W. Utt, Jr	970,359
Grasshopper catcher, M. V. Whiting	970,004
Grinding barrel, D. C. Demarest	970,020
Grinding device, Pike & Hayne	970,351
Grinding machine, awl, W. B. Morse	969,896
Guard, D. D. Ogilvie	970,099
Hair dressing comb, C. H. Royalty	970,390
Hammock, knockdown couch, I. E. Palmer	970,388
Hammocks, canopy attachment for, C. S. Huffman	969,956
Handkerchiefs and like articles, machine for folding, R. Cunningham	970,424
Handle. See Tool throttle handle.	
Handle-making machine, M. Kamenstein	970,059
Harness attachment, E. Cowan	970,310
Harness, draft, T. W. Schlater	970,119
Harpooning device, S. Coleman	970,018
Harvester, corn, D. B. Raworth	970,266
Harvester cutter, B. F. Weathern	969,817
Hat planking machine, felt, A. Turner	969,999
Hatch fastener for vessels, M. Mulholland	970,447
Hay fork attachment, T. S. Barbour	970,415
Heat control, automatic electric, H. G. Geissinger	969,781
Heater, C. H. Hysong	970,450
Heating apparatus, hot air, C. St. John	970,117
Heel plate and frame, A. H. Devin	970,313
Heel spring, Taylor & Thomas	970,276
Hinge, W. T. Wightman	969,926
Hog holding machine, G. W. Cox	970,187
Hoisting device, brake, A. Bolzani	969,834
Horn, E. Teste	970,136
Horse releaser, T. Noble	970,346
Horseshoe, A. & J. Schwartz	970,267
Hose and pipe mender, F. J. Stulp	969,919
Hose rack, self-releasing, S. L. Crossing	970,188
Hose support, J. E. Austin	970,164
Humidifier, J. W. Fries	969,854
Hydrant cap, W. S. Reed	969,905
Hydraulic power plant, J. T. Dougine	970,196
Hydraulic power system, T. A. Macdonald	969,907
Hydroextractor, C. Miller	970,253
Ice cream freezer, C. K. Greaves	970,369
Incubator, G. M. Curtis	970,311
Incubator heater, M. M. Johnson	970,057
Indicator, C. Emsheimer	970,200
Ink, W. G. Fuerth	970,439
Inking mechanism, J. S. Duncan	970,027
Insect catcher, F. M. Carter	970,181
Insecticide and disinfectant, J. C. Dooley	970,434
Insulator, J. A. Muerling	970,078
Internal combustion engine, S. Lake	970,063
Internal combustion engine, L. A. Martha	970,251
Ironing cabinet, C. D. Booton	970,174
Ironing table, G. Foster	970,207
Irrigation system, M. P. McCulloch	970,383
Jar holder, B. F. Bain	970,365
Journal and bearing, A. J. Fisher	970,030
Journal box, L. G. Woods	969,933
Journal box, S. J. Strid	970,133
Journal box, lubricating, G. P. Simmons	970,271
Journal lubricator, E. B. Brown	969,838
Junction box, M. Lauz	970,377
Keyboard, musician's exercising, A. K. Virgil	970,144
Kiln. See Calcining kiln.	
Knit drawers, lady's, M. Saldin	969,808
Knitting machine, Vermilyea & Hammersley	970,282
Knob and bell, combined door, R. Haselrigg	970,222
Kraut cutter, J. S. Randolph	969,979
Labels or wrappers to blocks, packages, or tins, or other containers of material, apparatus for applying, W. & H. Rose	970,353
Ladder attachment, E. J. Curran	970,425
Lamp burner, O. M. Muller	970,084
Lamp chimney, composite, G. D. Willits	969,932
Lamp, incandescent gas, J. Rubin	969,984
Lamp, miner's, P. Tegiesen	969,812
Lamp, projecting, G. A. H. Kellner	969,785
Lamps, pull socket for electric incandescent, J. L. Moore	970,255
Lantern holder, N. D. Bjorkiund	970,171
Latch, F. C. Altmann	970,007
Lathe tool post, H. Haldy	970,219
Laundry iron, E. R. Smith	969,991
Leather and product thereof, coloring, M. M. Gregg	970,326
Leather skiving machine, J. R. Scott	969,987
Leather working tool, C. F. Punsky	969,806
Level attachment, plumb, W. A. Goble	969,855
Lifting jack, I. Key	970,239
Lighter, automatic, S. B. Battey	970,294
Linotype machines, chute aping for, G. E. Wallin	970,146
Lint packing apparatus, G. W. Cameron	969,841
Liquid actuating apparatus, R. Conrader	969,940
Liquid fuel burner, B. R. Phillips	969,978
Liquid fuel burner, J. P. Hollenbeck	970,335
Lock, A. F. Schroeder	970,125
Lock, G. N. Mason	970,252
Lock mortiser, L. M. New	970,397
Locomotive, O. G. Pendleton	970,389
Locomotive frame, G. C. Abbe	970,287
Log impregnating apparatus, S. Willner	970,409
Log marker, O. Bureau	970,012
Loom shuttle, Snow & Stubbings	969,912
Magnet, alternating current, A. Simon	969,809
Mail box, O. J. W. Gleason	969,948
Mail box holder, E. C. Lillie	969,965
Mail pouch catcher and deliverer, E. J. Lahan	969,964
Mail wagon, G. A. Flinn	970,437
Manure loader and like device, J. J. Novak	970,259
Match receptacle, Stenlik & Barilla	969,916
Mattress, O. M. Burton	969,840
Measuring device, skirt, A. M. Allen	970,006
Mechanical movement, J. H. Amble	970,163
Memorandum rack, R. D. A. Parrott	970,103
Menu card holder, W. H. Sawyer	970,399
Metal working machine, H. Hess	970,330
Meter. See Telephone meter.	
Mine prop, J. H. Eickershoff	969,851
Miter box, J. J. Gregory	970,327
Mold, G. C. Dager	970,426
Molding machine, W. H. Hofmann	970,334
Mop head and wringer, combined, Douglass & Willett	970,197
Motion transmitting device, D. E. Seiders	969,910
Motor starter, C. T. Henderson	969,896
Motors, method of and means for controlling regenerative electric, R. E. Landell	969,894
Mower, motor lawn, H. S. Mustin	969,797
Mowing machine, J. P. Crosthwait	970,019
Music leaf turner, E. Scheibner	970,400
Music roll actuator, swinging, N. D. Hosley	969,783
Nail, J. A. Cunningham	970,423
Nail clipper, H. Leineweber	970,067
Nut and bolt lock, G. R. Knobeloch	969,786
Nut lock, M. Omalia	970,101
Nut lock, O. H. P. G. Spencer	970,274
Oil and gas burner, C. Donaldson	970,022
Oil and water elevator, T. H. McDonald	970,093
Oil burner, M. J. & W. L. Wright	970,156
Oil burner, W. H. Bradley	970,300
Oil burner, crude, E. J. Owen	970,390
Oil or gas burner, A. W. Andorfer	970,363
Oiler, hand street, J. Archdeacon	970,290
Oiling device for stocks and dies, G. T. E. Henriksen	969,807
Optical purposes, color screen for, C. Ramstein-Geschwind	970,111
Orchard heater, J. L. Hamilton	970,044
Ore roaster, A. B. Willey	970,327
Ores, treating, E. B. Goodwin	970,325
Outlet box, C. T. Pratt	969,805
Package protector, A. Griesbeck	969,950

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Advertising in this column is 75 cents a line. No less than four nor more than 10 lines accepted. Count seven words to the line. All orders must be accompanied by a remittance. Further information sent on request.

READ THIS COLUMN CAREFULLY.—You will find inquiries for certain classes of articles numbered in consecutive order. If you manufacture these goods write us at once and we will send you the name and address of the party desiring the information. There is no charge for this service. **In every case it is necessary to give the number of the inquiry.** Where manufacturers do not respond promptly the inquiry may be repeated.

MUNN & CO., Inc.

AGENTS WANTED.

AGENTS.—New book. Greatest bonanza ever offered. Complete story of Aviation: Conquest of the Air. By Wright Brothers, Curtiss, Paulhan, Brookins and others. How to Build and Sail an Aeroplane. Hundreds of Illustrations. Only $1.50. Best terms. Outfit free. J. S. Ziegler Company, Chicago.

Inquiry No. 9016.—Wanted, machinery necessary for an installation of a plant for refining salt by a modification of the Bessemer process.

BUSINESS OPPORTUNITIES.

I WILL START YOU IN THE MIRROR BUSINESS. Best paying trade of to-day. Famous French method. $5 to $12 daily. Let me prove it. Free particulars. Corey, Dept. 32, Omaha, Neb.

Inquiry No. 9029.—Wanted, catalogues and all information on machinery for braiding straw in manufacturing straw hats.

$2,000.00.—WE WILL LEND YOU $2 000 UNDER certain reasonable conditions, and agree that you may repay the loan from the dividends on an investment which we will suggest. For full information, address Continental Commercial Co., St. Louis, Mo.

Inquiry No. 9060.—Wanted to buy machinery to manufacture seed corn racks.

PATENTS FOR SALE.

FOR SALE.—My Canadian patent on boring tool for boring brick walls; greatest thing out. Every plumber and pipe fitter and all mechanics in the building line needs one. For further information address Halliwell, 1134 West 10th Avenue, Denver, Colo.

Inquiry No. 9027.—Wanted, the address of manufacturers of sewer pipe, made of fiber and asphaltum, suitable for laboratory use.

OUTRIGHT OR ROYALTY. Patent No. 967,053. Drinking Fountain for Fowls that is destined to fill a long felt want. Simple and cheap to manufacture. Terms reasonable. Address Geo. V. Sandle, care of General Delivery, Ashtabula, Ohio.

Inquiry No. 9099.—Wanted, address of manufacturers of machinery for making wire cables.

PATENTS WANTED.

PATENTS WANTED.—We will buy outright or on royalty U. S. patent rights on a small article that would prove to be salable proposition if placed on the market properly. Address Manufacturer, Box B, Anderson, Ind.

Inquiry No. 9143.—Wanted, name and address of the manufacturers of an air mattress.

TYPEWRITERS.

TYPEWRITERS.—Every make, each entirely rebuilt and refinished; guaranteed satisfactory or may be returned. Illustrated list free. Agents' discounts. Typewriter Clearing House Co., 37 Broadway, New York City.

Inquiry No. 9153.—Wanted, name and address of manufacturers of a knotless clothes line.

WANTED.

WANTED.—On royalty or purchase, patent for a practical device, light metal specialty preferred. Must be an article for which there is a wide and continuous demand. C. R. Spicer, Aurora, Ill.

Inquiry No. 9155. Wanted, the address of manufacturers of an electric milking machine.

WANTED.—Second-hand Universal Milling Machine with index head. Must be in first-class order. Address, stating price, dimensions and condition of machine, to George Holz, 31 Day Street, N. Y.

Inquiry No. 9173.—Wanted, manufacturers of machinery for removing fibre (coir) from cocoanut husks.

LISTS OF MANUFACTURERS.

COMPLETE LISTS of manufacturers in all lines supplied at short notice at moderate rates. Small and special lists compiled to order at various prices. Estimates should be obtained in advance. Address Munn & Co., Inc., List Department, Box 773, New York.

Inquiry No. 9175.—Wanted, manufacturers of a machine called Betasco or Blasco, used in the manufacture of ostrich feathers.

SALE AND EXCHANGE.

A LIST OF 1,500 mining and consulting engineers on cards. A very valuable list for circularizing, etc. Price $15.00. Address Munn & Co., Inc., List Department, Box 773, New York.

Inquiry No. 9183.—Wanted, manufacturers of tantalum instruments for making dies and counter dies of that metal, and edge steel dies.

Inquiry No. 9184.—Wanted, a portable alfalfa meal mill, one that will do about 20 to 25 tons per 10 hours.

Inquiry No. 9186.—Wanted, manufacturers of machines for making change.

Inquiry No. 9188.—Wanted, manufacturers of rubber block tires for one ton trucks.

Inquiry No. 9190.—Wanted, name and address of parties who make for sale pattern letter moulding machines and matrix.

Inquiry No. 9191.—Wanted, the address of firm who manufactures or handles the McCullough damper regulator for boilers.

Inquiry No. 9192.—Wanted, the address of parties who can furnish ore containing bismuth.

Inquiry No. 9193.—Wanted, the address of manufacturers interested in fibre novelties.

Inquiry No. 9194.—Wanted, the address of the Allen Condensed Air Ice Machine Company.

Inquiry No. 9195.—Wanted, manufacturers of a 1 or 2 H. P. boiler worked with kerosene as fuel.

Packing, F. Hodgkinson 969,869
Pad holder, W. E. Dunning 969,775
Paper dishes, machine for making, I. Bertin 970,108
Paper fixture, toilet, H. J. Williams 970,150, 970,151
Paper making machinery, J. A. Noble 969,800
Paper receptacles, machine for forming and attaching fasteners to, C. D. Grimes 970,314
Pen and pencil box, F. Hasselberger 970,049
Penholder and pen therefor, G. B. Elliott 970,315
Perambulator, foldable, C. E. Fanning 970,202
Petticoat band adjusting device, C. H. Lewy 970,068
Phonograph controlling device, C. L. Hibbard 970,223
Phonograph, graphophone, and like instrument, E. G. H. Stein 969,917
Phonograph record ejector, E. Gilbert 969,946
Phonograph reproducer, A. Urbahns 970,142
Photographic plates, drying rack for, A. N. Pierman 970,108
Photographic printing machine, W. E. Service 970,127
Photographic purposes, portable inclosure for, O. Pascale 970,104
Photographs in colors and causing them to appear stereoscopically, apparatus for taking, L. Geisler 970,322
Piano hammers, removable mold for making, E. T. Wolf 969,826, 969,827
Pin, W. H. Rice 969,807
Pipe and the like cutter, J. R. Hamilton 969,858
Pipe coupling, F. N. Cronholm 969,943
Pipes, covering, E. A. Kellam 970,235
Pistol, automatic, C. P. Clement 970,307
Planter, corn, T. N. Seay 970,268
Planter, cotton, G. W. Copeland 970,186
Plow, O. H. Peeples 970,105
Plow vine cutting attachment, W. R. Melson 970,379
Plug switch, H. E. Leppert 969,787
Plume, L. Montilli 969,795
Pocket knife, J. L. & W. Schrade 969,909
Pole tip, L. L. Moore 970,081
Post. See Binding post.
Poultry drinking fountain, F. Enos, Jr. 969,852
Power transmission mechanism, B. D. Fuller et al 970,440
Pressing, punching, and cutting machines, etc., protecting mechanism for, G. Kramer 969,961
Printing machine, W. Scott 970,125
Printing machine, rotary, F. Waite 970,009
Printing moving picture films, Dyer & Holden 970,199
Printing press rolls, stand for holding, E. J. Hampton 970,046
Printing presses, control attachment for fountains of platen, Saunders & Croft 970,355
Printing presses, paper stripping device for, H. C. Gammeter 970,441
Projectiles, manufacture of hardened steel, C. Davis 970,428
Propeller, L. R. Fulda 970,319
Pug mill and stone separator, C. W. Kilborn 970,240
Pulley block, A. Smith 969,989
Pulley brake and grip, Boutwell & Marshall 969,835
Pulper, rough, J. T. Tompkins 969,998
Pump, G. J. Dourte 970,435
Pump barrel attachment, W. N. Riddle 970,352
Pump, pneumatic, T. Davis 969,847
Pump valve, G. E. Mack 970,249
Rail anchor, C. F. Clawson 970,306
Rail joint, F. O. Adams 970,158, 970,159
Rail joint, J. R. Hall 970,230
Rail joint, insulated, L. Griffith 969,856
Rail supporting mechanism, R. D. Townsend 970,139
Rails, device for preventing the creeping of, J. T. Bluff 970,418
Railway brake, manually operated, A. A. Searway 970,402
Railway gate, F. Clark 970,305
Railway switch, F. Malone 970,343
Railway track drill, F. E. Damron 970,312
Range, combined gas and hard fuel, C. H. Miller 969,793
Ratchet wrench, A. M. Fulkerson 970,320
Rattler, G. P. Hemstreet 970,373
Reaping and mowing machine pitman wheel, H. O. Trowbridge 970,140
Receptacle closure, E. N. Gilfillan 970,037
Reel, R. C. Redpath 970,394
Regulator. See Damper regulator.
Resilient wheel, W. S. Houser 970,229
Ribbon feeding mechanism, J. S. Duncan 970,028
Ribbon holding device, H. Malick 970,446
Rim bearing wheel, E. J. Baisden 970,291
Road bed, S. W. Lyman 969,966
Road dressers, retaining means for teeth of, H. L. Eggleston 969,850
Roentgen rays, preparation impermeable for, O. Gros 970,215
Rolling mill for producing tubes, M. Peters 970,263
Rotary engine, O. B. Jacobs 969,957
Rotary engine, Frazer & Vanlandingham 970,035
Rotating furnace, annular, W. B. Bary 970,293
Sad iron, Parkhurst & Weeks 969,976
Saddle, riding, R. W. Stone 969,995
Salts, production of ferric, A. G. Betts 969,833
Sash, air tight revolving window, L. Bofird 970,173
Sash closing mechanism, E. Georgeff 970,036
Sash fastener, H. W. Holmes 969,870
Sash lock, L. C. Petersen 970,350
Sash, puttyless window, R. Friedel 970,438
Sash weight, sectional, C. R. Brown 970,176
Saw guide, I. L. Keith 969,810
Scale, H. S. Hallwood 970,442
Scraper, D. J. Arpin 969,764
Scraper, R. C. Gline 970,323
Scraper, wheel, Thomas & Rodgers 970,277
Screen frame, S. T. Ashbaugh 970,102
Scythe-snath fastener, M. W. Hunsaker 970,338
Seal for pipe connections, sheet metal, Renick & Krick 969,981
Searchlight, projector, and the like, H. Viertel 969,814
Secondary battery, G. J. Johnson 969,876
Seed case, A. E. McKenzie 970,454
Seed dropping mechanism, J. Streits 969,918
Separation, process of, H. A. Wentworth 970,002
Sewing machine work guide or gage, L. Bulasky 970,179
Sewing machines, extension leaf latching mechanism for, C. E. Colegrove 969,938
Shade guide, P. G. Emery 970,452
Shade hanger and curtain support, B. Kreszberger 969,962
Shears or scissors, cushion for handles of, C. W. Tindall 970,406
Sheet delivery mechanism, variable size flat, H. M. Barber 970,366
Sheet registering device, L. E. Morrison 970,256
Ships, means for damping the rolling motion of, H. Frahm 970,368
Shock conveying machine, G. M. Clagett 970,304
Shoe, E. F. Raymond 970,393
Shoe, R. Helbig 970,444
Shoe horn and button hook, L. Davidoff 969,944
Shoe horn and button hook, combined, L. Davidoff 969,945
Shovel, B. C. Olmsted 969,975
Shutter worker, C. A. Gothing 970,039
Sifter, ash, H. Hough 970,336
Signaling system, H. O. Rugh 969,985
Silo, G. G. Griswold 970,041
Sister hook, L. E. Foster 970,033
Skeins or silk and like materials, apparatus for stretching and drying, J. Knott 969,960
Slack adjuster, A. R. Duffy 970,026
Sled knee, Goddin & Evans 970,324
Small arms, one-trigger mechanism for double barrel breech-loading, L. B. Tayler 970,405
Snow plow, G. W. Ruggles 970,451
Soap cutting machine, C. W. Aiken 970,161
Soap dispensing machine, F. G. Agrell 969,829, 969,830
Sodium cyanid, making, O. Liebknecht 969,885
Spark arrester, C. A. Rush 970,397
Speed indicator for motor cars and other vehicles, C. C. Smith 969,999
Spindle. See Spinning machine spindle.
Spindle driving bands, mechanism for guiding and tensioning, J. Boyd 969,768
Spinning machine, S. Z. de Ferranti 970,203
Spinning machine spindle, J. V. Cunaiff 970,189
Splice bar, S. G. Davis 970,430
Spoon gage, F. N. Cronholm 969,845
Spot cleanser, Malmros & Adams 970,069
Spring seat structures, border wire reinforcement for, L. A. Young 970,157
Spur, G. Buermann 969,839
Stacker, pneumatic, G. F. Comer 970,183

SEALED PROPOSALS.

WANTED.—Two first-class ordnance draftsmen at $5.04 per diem. A competitive examination will be held September 26, 1910, for the purpose of filling the above positions. For further information address, "Commandant, Navy Yard, Brooklyn, N. Y."

CONTRACTORS

Bids are invited for construction, equipment and operation of the Tri-Borough Subway and Elevated System of New York City, comprising about 44 miles of line, to be opened October 20, 1910.

Bids are also invited for construction only, with municipal money, to be opened October 27.

Bids may be made for more of the sections into which the construction work has been divided.

Write or call concerning full details, including forms of contracts and plans.

PUBLIC SERVICE COMMISSION
For the First District
154 Nassau Street, New York City

Stamp, time, W. J. English	970,201
Storage battery, R. N. Chamberlain	970,420
Stove, C. H. Miller	969,792
Stove, collapsible camping, A. Kurt	970,342
Stove oven, cooking, F. Ziganek	969,828
Stoves, electric igniting device for gas, C. Stamm	969,993
Sugar, making grape, G. Ekstrom	970,029
Sulky seat, adjustable, A. Wilshire	969,825
Supporting post, B. E. Rudd	970,116
Table, W. Pelisheck	969,901
Tank. See Water tank.	
Teeth, apparatus for making backings for artificial, F. S. Sawaya	969,986
Telephone pole and the like, B. Haskell, 969,859, 969,860, 969,862,	969,863
Telephone apparatus, G. Babcock	969,832
Telephone attachment, Hewitt & Thomas	970,449
Telephone drop, A. H. Weiss	969,818
Telephone meter and circuit connection therefor, R. H. Manson	969,789
Telephone repeater, C. Adams-Randall	970,288
Telephone system, intercommunicating, H. D. Currier	969,774
Telephone system, private branch intercommunicating, J. L. McQuarrie	969,799
Telephone transmitter, Leich & Pedersen	970,066
[illegible]ters, coverit[illegible] for mouth- [illegible]	970,015
Tempe[illegible]	vis[illegible] 969,848
Terminal [illegible]	969,816
Thill coupling [illegible]	969,937
Thill support, F. [illegible]	970,285
Thumb sucking preven[illegible]	Crandall 969,942
Tie plate and rail brace, [illegible]	Hanks 970,414
Tin plate catching machine, [illegible] J. Szabo	970,134
Tire, demountable, V. Wildner	970,005
Tire inflater, W. R. Heck	970,329
Tire protector, pneumatic, E. Russell	969,908
Tire, sectional wheel, J. C. Lighthouse	969,889
Tire, wheel, J. C. Lighthouse	969,890
Toggle, H. H. Cummings	970,422
Toilet and dressing table, G. [illegible] Utterback	970,143
Tongue, automatic, F. X. La [illegible]erburg	970,244
Tool and tool holder, A. K. Rosenbeck	969,985
Tool holding block, J. C. Buckley	970,177
Tool, household, J. C. Forster	970,206
Tool throttle handle, pneumatic, W. M. Holden	970,225
Tooth powder distributer, H. Hoelzer	970,224
Torch, C. Johnson	969,875
Torpedo director, G. C. Dav[illegible]	970,431
Towel sterilizer, J. P. Reardon	969,904
Trace supporter, G. D. Holm	970,226
Track binder, J. F. Hudson	970,054
Transmitter for teleselectors, E. Blos	970,367
Trash receptacle and crematory, S. Karlson	969,879
Tree. See Boot and shoe tree.	
Trolley base, C. E. Glerding	970,211
Trolley retriever, W. C. Starkey	969,994
Trousers hanger and stretcher, L. G. Hunter	969,872
Truck, hand, F. E. Thomes	970,137
Truck, locomotive trailer, W. S. Hodges	970,333
Trucks, side play liner for locomotive, Thoms & Dummert	970,138
Trunk, C. H. Paxton	969,900
Turbine, P. F. Nydegger	969,974
Turbine, W. G. Dodd	970,193
Turbine blades, shrouding, A. W. Clarke	969,843
Turbine, elastic fluid, W. J. A. London	969,891
Turbine, gas, Forsberg & Ljungstrom	970,204
Turbine, reentrant, G. Westinghouse	969,821
Turbine, steam, H. Peters	970,100
Turpentine cups, dipper for, F. Bailey	969,765
Typewriter, book, G. W. Deming	970,195
Typewriter inking attachment, E. A. Beard	970,295
Typewriter tabulating device, G. W. Doning	970,433
Typewriting machine, A. T. Brown	969,836
Typewriting machine, H. H. Steele	969,915
Typewriting machine, C. Holland	970,052
Typewriting machine, H. W. Merrett	970,076
Vacuum cleaning apparatus, W. H. Jakway	970,232
Valve, J. F. Jennings	969,874
Valve, M. H. Owen	970,387
Valve, automatic cut-off, J. C. Smith	969,911
Valve, automatic safety gas, A. H. Lake, Jr.	970,062
Valve, float controlled, W. S. Bellows	970,167
Valve, gas producer regulating, H. I. Lea	969,884
Valve gear, Corliss, F. Phillips	969,802
Valve, lubricating, T. J. Barbre	970,292
Valve mechanism for controlling fluid admission, G. Woodall	970,411
Valve, priming check, J. A. H. Provost	969,902
Valve regulator, fluid pressure, T. M. Wilkins	970,284
Valve, relief or safety, W. L. Osborne	970,348
Valve spring remover, J. Turner	970,141
Valve, stop, T. Pollock	969,803
Valve, stop and through way, F. W. Leevers	970,245
Valves, device for preventing the ignition of pressure reducing, A. B. Drager	970,024
Vaporizing device, A. A. Low et al	969,893
Vault, grave, J. W. Freeman	970,208
Vehicle body, D. J. Kerstetter	970,238
Vehicle heater, G. S. Johnston	969,784
Vehicle rim, M. L. Williams	969,929
Vehicle rim, detachable, M. L. Williams	969,930
Vehicle steering device, A. D. Baker	969,766
Vehicle wheel, H. Scullin	970,126
Vehicles by compressed air, system and apparatus for propelling, J. O. Cobb	969,772
Velocipede propelling mechanism, J. T. Plummer	970,109
Vending machine, Krig & Scherk	969,885
Vending machine, coin controlled, C. C. Clawson	969,844
Vending machine coin controlled mechanism, L. A. Vandiver	970,280
Vending machine, stamp, Nielsen & Petersen	969,973
Ventilating apparatus, M. I. Shapiro	970,403
Ventilator, R. W. Carrington	969,842
Voting machine interlocking mechanism, C. H. Ocumpaugh	970,260
Wagon, A. D. Ellsworth	970,436
Warping machine, A. Murphy	970,085
Washing machine, F. H. Wiard	969,823
Washing machine, L. Harris	969,952
Washing machine, J. C. Forster	970,205
Water level regulator, N. G. Copley	970,421
Water tank, vacuum wall hot, G. C. H. McPheeters	970,095
Watering trough, A. C. Michael	970,079
Wave motor, W. L. Raht	969,903
Wave motor, N. O. Harmon	970,048
Weeding machine, H. H. Goe	970,212
Weeds, destroying, W. Hoskins	970,375
Weight, dress, E. J. Brooks	970,175
Wheel. See Car wheel.	
Wheel, J. C. Lighthouse	969,886, 969,887
Wheel and tire, J. C. Lighthouse	969,888
Wheel rim, vehicle, J. R. Gammeter	969,779
Winding device, safety, E. Hawkins	970,221
Window, S. C. Franks	969,778
Window, F. G. Beachlin	970,009
Window, J. E. Richardson	970,114
Window opener, automatic, A. A. Monson	970,390
Window pane fastener, W. H. West, Jr.	969,820
Window screen, H. Petersen	969,977
Wine press, J. Pignocco	970,391
Wire stretcher, W. H. Hannah	969,951
Wire with yarn or its equivalent, machine for covering or insulating, D. Noble	970,098
Wool washing machine carrier, F. G. Sargent	970,118
Wrench, W. G. Keller	969,880
Wrench, A. & B. W. Fresko	970,209
Wrench, U. C. Greggs	970,371
Yellow lake, E. Meckbach	970,072
Yellow lake, new, E. Meckbach	970,073
Yoke attaching device, wagon tongue, F. G. Mitchell	970,254

A printed copy of the specification and drawing of any patent in the foregoing list, or any patent in print issued since October 4th, 1859, will be furnished from this office for 10 cents, provided the name and number of the patent desired and the date be given. Address Munn & Co., Inc., 361 Broadway, New York.

Canadian patents may now be obtained by the inventors for any of the inventions named in the foregoing list. For terms and further particulars address Munn & Co., Inc., 361 Broadway, New York.

(*Concluded from page 244.*)

with dishonest weights and measures as they deserve. Good scale makers approve the rigorous execution of all weight and measure legislation, and it is beginning to be demanded by the honest merchant as an insurance against dishonest competitors with short weights and fast scales. Such work as that outlined is but a part of the duties of a local bureau of weights and measures; and with the interest aroused, and the opportunities for usefulness in many fields, it is bound to develop. With such progress undoubtedly will come ere long uniform state and national legislation, which will aid materially in solving the various problems whose existence is now only too well recognized.

A NOVEL SYSTEM OF X-RAY CINEMATOGRAPHY.

(*Concluded from page 232.*)

screen at its lower end. This screen allows the object to be observed at any time with X-rays without disengaging the film. In fact, a single discharge is sufficient to ascertain whether the animal is well adjusted in front of the window and whether its organs of digestion are at the proper phase of their activity.

The third part of the arrangement is the X-ray apparatus. In connection with his earlier experiments on frogs, Carvallo obtained quite satisfactory results with a Carpentier induction coil, and electromagnetic interrupter and a self-regulating X-ray bulb. In order, however, to insure a greater rapidity of current interruption, he eventually constructed an ingenious interrupter, which, with a remarkable constance, effects breaks of less than 1/1,000 second's duration. In a similar manner to the duration of break, the duration of current closures can be adjusted at will by means of spiral springs. A current of only 50 volts thus allows satisfactory X-ray pictures to be obtained with current closures of 1/90 to 1/100 of a second.

In opposition to his predecessors, Carvallo finds induction coils of medium output to be most suitable for the purpose, the photographic effect of discharges ceasing to increase from a given intensity. His experiments are limited to the smallest animals of each class, thus preventing any excessive formation of X-ray pictures, while reproducing the organs of digestion on a relatively short length of film.

The animals under test were fed with a certain alimentary paste or with their usual food mixed with basic bismuth nitrate. In order to check the results thus obtained, the digestive tube of a frog was isolated and photographed directly with the cinematographic apparatus. As both in the case of X-ray pictures and direct photographs the same type of motion was observed, Carvallo's X-ray pictures may be said to afford a reliable reproduction of the digestive process in animals the most differently constituted.

Barges filled with stone and sand are now unloaded at the Gatun docks by means of searchlights. There are one single and two duplex cableways for unloading sand and rock, and one searchlight for each cable has been placed on the tall towers, casting a light along the cables, on the barges at the dock and over the storage piles. The searchlights are 18-inch standard Navy projectors, and are operated by a motor generator which converts current supplied at 600 volts from the power plant to current at 125 volts for the lamps. The lights are controlled from the head or operating towers. In addition to the searchlights, strings of flame arc lamps have been stretched from the head towers to the tail towers, four lamps for each tower. These lamps form their arc at the apex of an acute angle made by the carbons, and therefore throw a light equally in all directions. On this account, although they are strung below the level of the cables, they illuminate them as well as the storage piles beneath.